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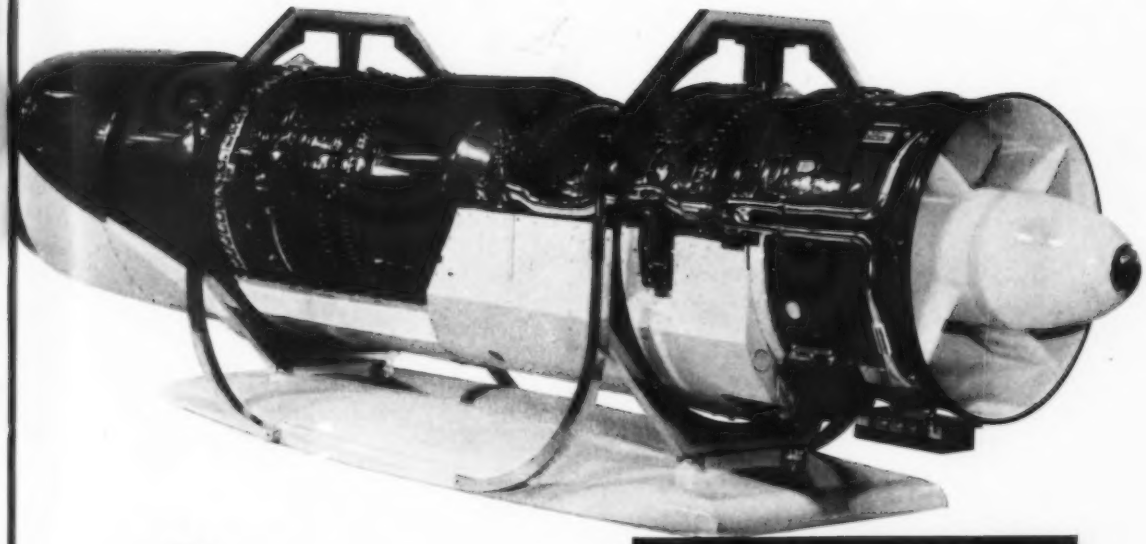

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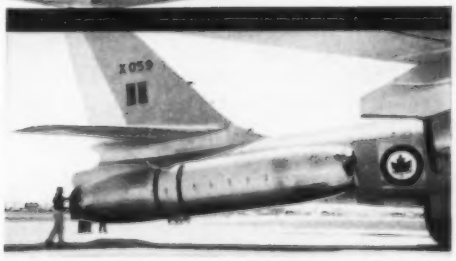

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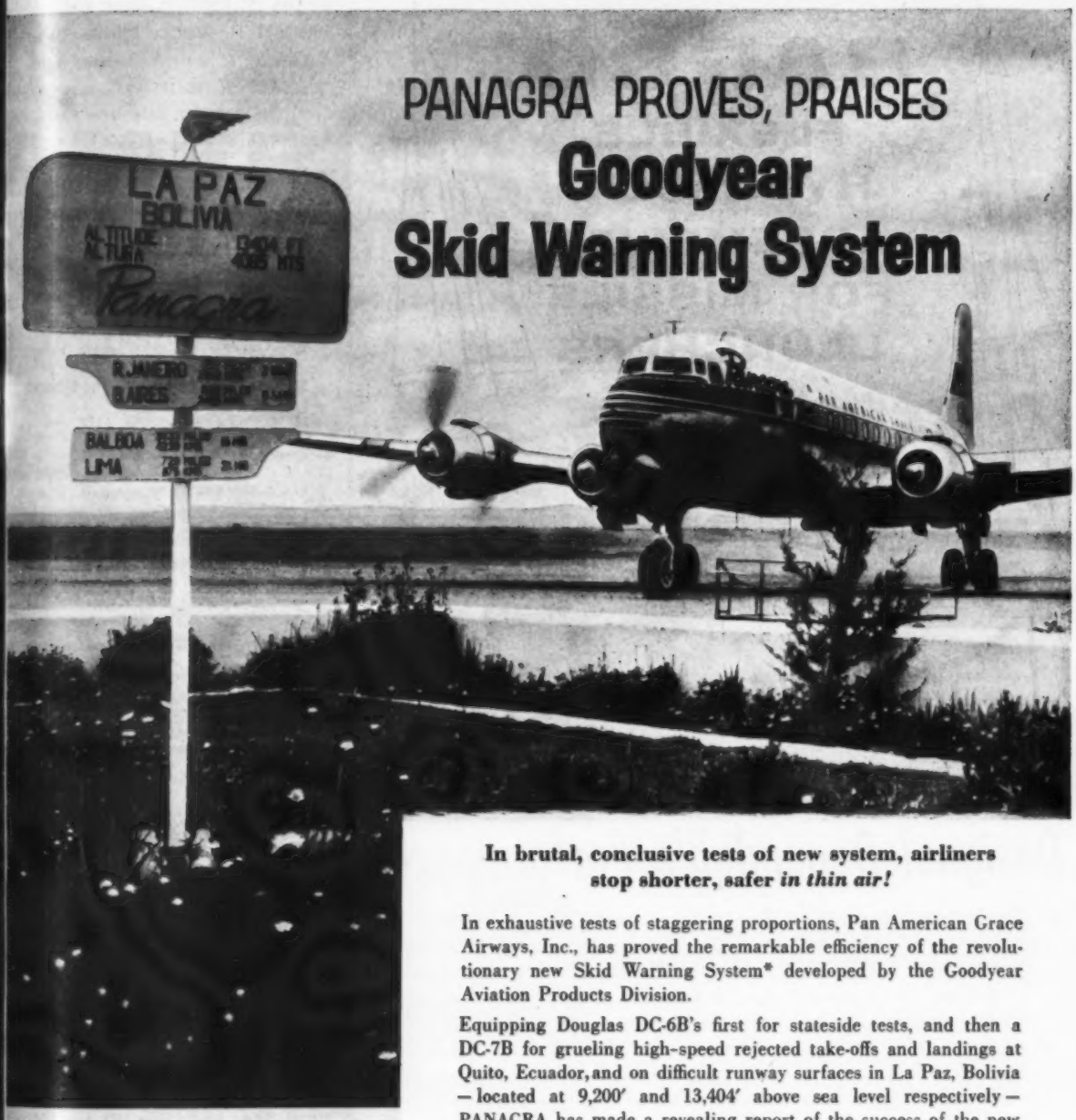

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PUBLISHING INFORMATION . . . **Published:** Every other Monday by American Aviation Publications, Inc., Washington, D. C. Printed at The Telegraph Press, Harrisburg, Pa. Entered as Second Class Matter in Washington and Harrisburg. **Subscription Rates:** For U. S. and Canada—$5.00 for 1 year, $8.00 for 2 years. Other countries—$7.00 for 1 year, $12.00 for 2 years. Subscription limited to aviation industry personnel. **Incorporates:** Airports and Air Carriers; Aviation Equipment; The American Pilot; Aviation Sales & Service; U.S. Aviation; and American Airports. All rights to these names are reserved. **Change of Address:** Send old address (exactly as it appears on mailing label on your copy of magazine) and new address, including zone number if any to American Aviation, 1001 Vermont Avenue, N.W., Washington 5, D. C. Allow two weeks for changeover.

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SEPTEMBER 23, 1957—VOL. 21, NO. 9

AMERICAN AVIATION

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ook gives industry views on cutbacks
IA chief says the situation is not cataclysmic, ut warns that government should proceed ith caution in applying brakes to produc- on. Some subcontracting may be pulled ack. Page 31.

ayes Aircraft diversifies to boost sales
he Birmingham firm is adding jets to its B-50 tankers for AF, specializing in instru- entation, and even building school lockers. et result: $55 mililon sales. Page 33.

ome closeups of features at Farnborough
ondon Editor Jim Stevens, accompanied by s camera, got in close at the SBAC show give AMERICAN AVIATION readers a view new British developments. Page 40.

here's style, comfort in new airline seats
ew style airliners need new style seats, d here's a look at what you'll see in the ture. Hardman is using as many as eight abrics in one of its designs. Page 56.

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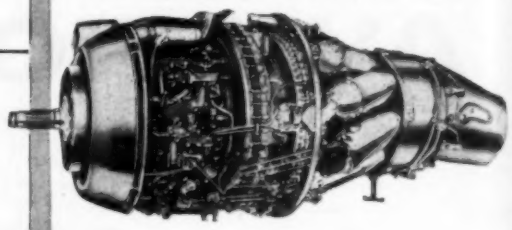

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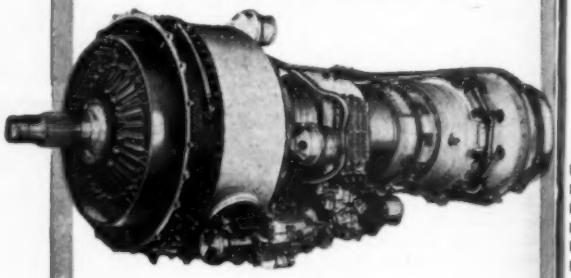

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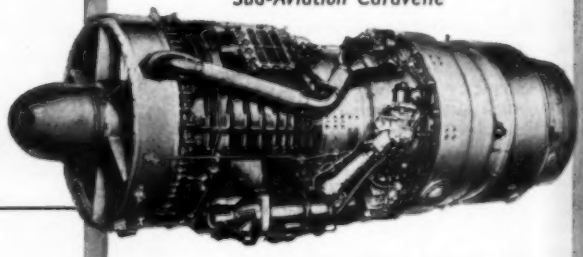

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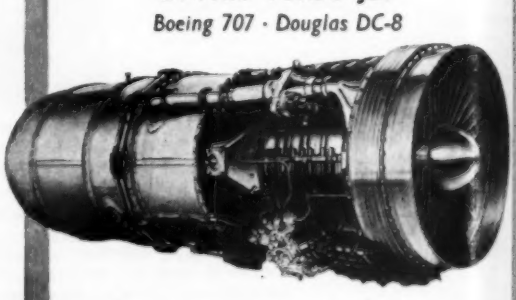
BY-PASS TURBO JET

Boeing 707 · Douglas DC-8



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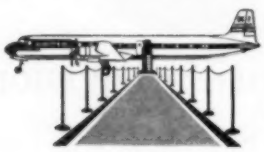

UNITED AIR LINES

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IATA, Madrid and the CAB

IT IS QUITE PROBABLE that the Civil Aeronautics Board was blissfully unaware of the depth and length of its shadow over the annual meeting of the International Air Transport Association in Madrid early this month.

But unaware or not, it was the CAB more than any other factor that prompted the nearly-successful decision to move IATA headquarters from Montreal to Geneva. Many European carriers are fed up to the teeth with CAB's efforts to dictate the world's airline fares and policies. An actual majority—by one vote—approved the transfer but the proponents of the move were gracious enough not to force the issue with such a slim majority.

Nevertheless, the vote was a not-so-subtle warning to CAB in Washington that it is putting on the pressure too severely and endeavoring to be too dictatorial to the rest of the world. The truth is that unless CAB becomes more moderate in its attitude, there will develop a period of chaos and ultimately a World CAB which no one really wants. CAB should recognize that there are many retaliatory weapons that can be used by the rest of the world to the detriment of American carriers.

Beyond the decision not to move to Geneva from North America, IATA took steps to strengthen and revitalize its executive committee. As we pointed out on this page several issues ago, this key committee should be composed of actual operating heads of airlines, either presidents or active board chairmen. Steps have been taken to implement this sound policy and to this extent we are much heartened.

But apart from those two decisions, the Madrid meeting was something of a dud and for a rather unexpected reason. The operators were submerged in a sea of commercial airplane selling and entertaining to such an extent that the purposes of IATA as an assembly of operators was aborted.

There is nothing wrong whatever about good healthy salesmanship in the airplane business. Sales rivalry is a very good thing all around if confined to sensible bounds. But the American, British and French manufacturers went overboard with a fantastic amount of very de luxe late-hour entertaining to such an extent that either upset tummies or upset tempers, or both, resulted. There were more commercial salesmen than delegates in Madrid.

We suspect that Madrid represented the zenith of commercial attention to the annual IATA meetings and that the salesmen, by mutual consent, will have to take a back seat in the future. The place to sell airplanes is on the home grounds of the operators. A certain amount of social courtesies such as daily buffets and lavish dinners is in order but the effort got far out of control at Madrid with the result that the manufacturers dominated the scene to the detriment of serious IATA meetings and made it difficult for operators to socialize among themselves.

Next year's meeting will be in New Delhi, India. Perhaps the distance from Europe and the U.S., to say nothing of the legally "dry" status of the host country, will hold down the commercial attendance and permit the operators to spend more time with their fellow operators. It must be said in all justice that the entertaining by manufacturers was on a high and generous level; there was just too much of it.

Meantime the CAB has taken an extraordinary action destined to incur even more ill feelings in Europe than before. By announcing in advance that it will reject any fare increase on the North Atlantic which may be resolved at the IATA traffic conference in Miami Beach starting Sept. 24, the CAB has been startlingly unjust and injudicious. On what basis is CAB prejudging a fare increase? On what basis does CAB pretend that its high-handed action is in line with the formulation of international agreements and the furtherance of international relations?

But CAB seems to be unaware of either judicial procedure or common sense. It must feel that it has a winning hand to be able to force all other airlines and foreign governments to bow to its commands. But the CAB squeeze is being applied much too tightly. The winning hand may prove to be useless if the game breaks up. And the ultimate losers will be everyone including especially the traveling public.

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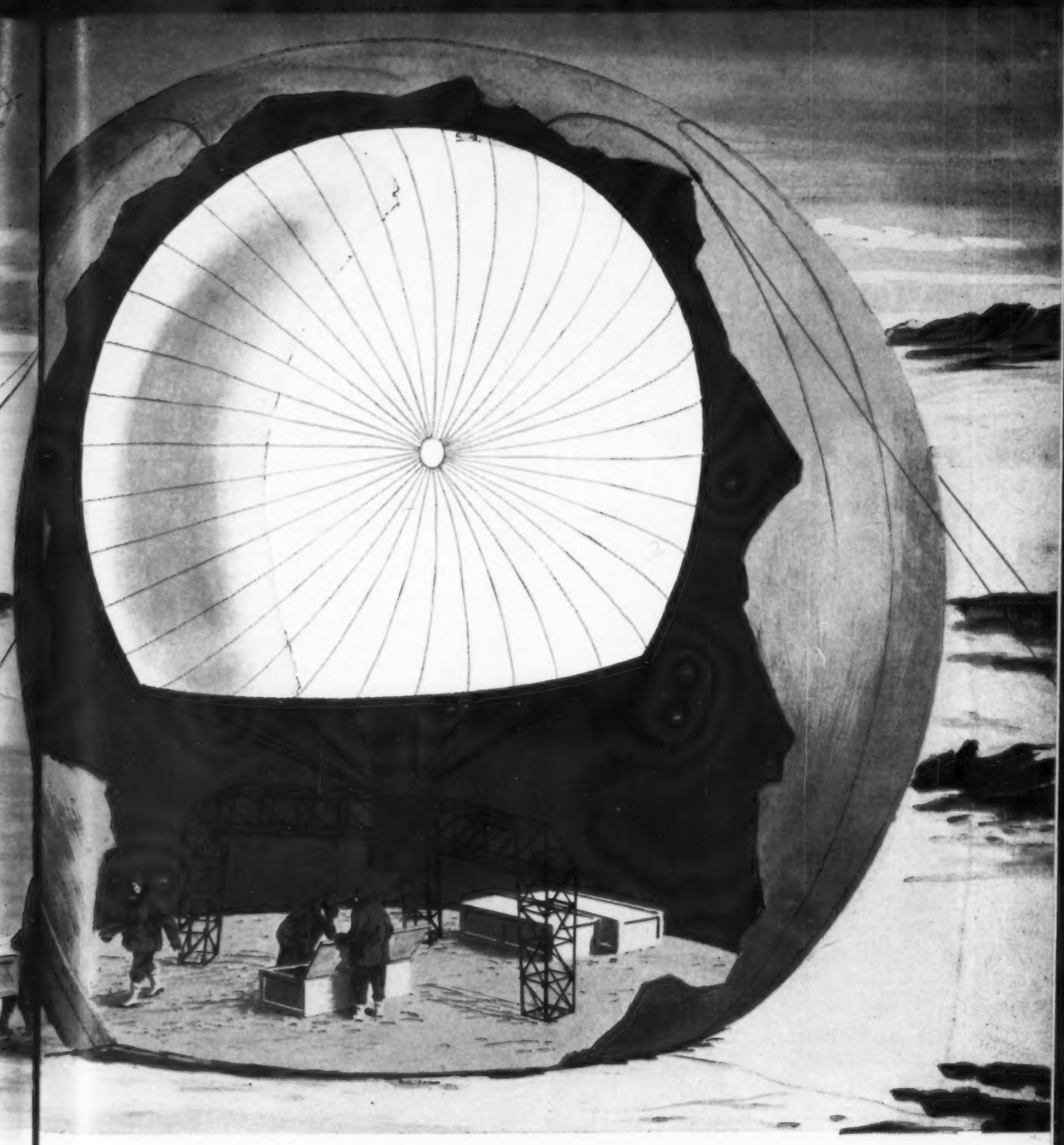

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WHEN—WHERE

SEPTEMBER

ASME fall meeting, Hotel Statler, Hartford, Conn., Sept. 23-25.

Composite and joint meeting of IATA traffic conference, Miami, Sept. 24.

Air Freight Cartage Conference, Chicago, Sept. 24-25.

Champion Spark Plug & Ignition Conf., Secor Hotel, Toledo, Sept. 24-26.

Radio Technical Commission for Aeronautics, fall meeting, Mayflower Hotel, Washington, Sept. 26-27.

Airwork-Pratt & Whitney annual forum, Airwork Corp., Miami Villas, Miami, Sept. 27.

SEA Aeronautic meeting, Aircraft Production forum and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Sept. 30-Oct. 5.

OCTOBER

National Airports Conference, University of Oklahoma, Norman, Oct. 2-4.

National Business Aircraft Assn., 10th meeting and forum, Denver, Oct. 2-4.

International Northwest Aviation Council, annual convention, Palliser Hotel, Calgary, Canada, Oct. 6-8.

National Electronics Conference and Forum on electrical research, development and application, Hotel Sherman, Chicago, Oct. 7-9.

Triennial Inspection of the NACA Lewis Propulsion Lab., Cleveland, Oct. 7-10.

International Astronautical Federation, annual congress, Barcelona, Oct. 7-12.

Annual Airport Development and Operations Conference sponsored by N. Y. State Bureau of Aviation, Onondaga Hotel, Syracuse, Oct. 8.

International Union of Aviation Insurers, annual general meeting, Amsterdam, Holland, Oct. 8-11.

Society for Experimental Stress Analysis national fall convention, El Cortez Hotel, San Diego, Oct. 9-11.

National Noise Abatement Symposium, Armour Research Foundation, Sherman Hotel, Chicago, Oct. 10-11.

Air Traffic Conference, fall meeting, Key Biscayne Hotel, Miami, Nov. 11-13.

Vickers, Inc., hydraulics conference, Park Shelton Hotel, Detroit, Nov. 12-13.

ASTA convention and world travel congress, Madrid, Spain, Oct. 13-20.

National Assn. of State Aviation Officials, annual meeting, Sun Valley, Ida., Oct. 16-18.

Canadian IRE Convention-Exposition, Automotive Bldg., Exhibition Park, Toronto, Oct. 16-18.

National Society of Professional Engineers, fall meeting, Grand Pacific Hotel, Bismarck, N. D., Oct. 17-19.

American Helicopter Society, annual western forum, Statler Hotel, St. Louis, Oct. 20-22.

IRE national symposium on engineering writing and speech, Sheraton-McAlpin Hotel, New York, Oct. 21-22.

IAS meeting, Canadion Aeronautical Institute, Montreal, Oct. 21-22.

Computer applications symposium, Armour Research Foundation, Harrison Hotel, Chicago, Oct. 24-25.

Aircraft Electrical Society aviation display, (invit. only), Pan Pacific Auditorium, Los Angeles, Oct. 24-25.

Association of the U.S. Army, annual meeting, Sheraton-Park Hotel, Washington, Oct. 28-29.

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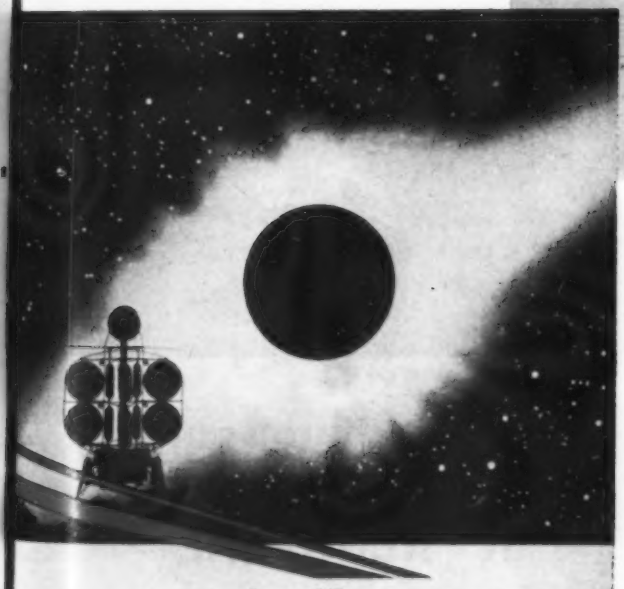

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LETTERS

Those anti-alcohol bills

To the Editor:

In regard to your Personal View column in the July 29 issue of your very fine publication, you extended very good coverage in regard to the proposed Anti-Alcohol bills now before Congress.

I am one who enjoys a Scotch and soda before dinner each evening; however, when I am aboard an airliner which serves drinks it seems out of place to me and entirely unnecessary. I am more interested in the success of aviation in this world than I am in bending my elbow. I feel that serving drinks on airline equipment casts unnecessary aspersions on the aircraft industry as a whole.

However, my concern upon reading your article was in your avoiding any mention of the filthy discourteous addiction commonly referred to as smoking. I have gotten to the point that I avoid riding any airline equipment if at all possible. I am forced to inhale residue particles in the atmosphere of the cabin made by some of the passengers sucking on cylinders of paper containing certain ground up weeds.

You have published articles describing the malfunction of cabin pressure regulators due to their being contaminated with the tar from cigarette smoke. Yet, I am supposed to sit there and breathe an atmosphere that causes malfunction of a mechanical device.

The big advantage of privately owned and executive aircraft is that you do not have to tolerate such a situation. Another subject is reduction of efficiency and safety of the flight crew. I know a TWA captain that does not allow any smoking on the flight deck, since he knows from experience that the safety of all aboard is reduced if the pilots are preoccupied sucking on a cigarette.

I would like to see you give us some coverage on this subject. The use of alcohol on an airliner is by choice, it affects only the user while smoking affects everyone on board. *DAVID D. BLANTON, President & Chief Engineer, Javelin Aircraft Company, Inc., Wichita, Kansas.*

To the Editor:

Your July 29 editorial entitled "Those Anti-Alcohol Bills" intrigues me, but in a rather disgusting way however. You seem to regard the high-altitude prohibitionists, the "pleaders" if you please, as a small and insignificant minority of radical crusaders and cranks whose motives are founded upon the constitution of the women's Tea and Biscuit Temperance League.

It might prove enlightening to you to learn that these anti-alcohol bills are put in the legislative hopper as a result of the opinions and demands of thousands of air travelers and other interested persons who are desirous of the safety of the airline industry; a desire which your article would have us believe is not your particular concern.

In my profession, I personally know of many "near-sighted and selfish dissenters" who would favor eliminating this public safety enemy no. 1 from walking up the ramps of our passenger airliners.

The only real tragedy I see, Mr. Editor, is that, in this fabulous age of speed where destinations are reached virtually in minutes, the chronic "wet snoots" can't control their thirsts long enough to survive the trip without alcoholic midair refueling.

Free national maturity would legislate for public and individual well being and welfare; selfishness and inconsideration is the platform of the immature.

With the millions of past alcoholic-induced tragedies marking the history of travel in this country, I suggest that you take a good objective look in your mirror and ask yourself whether there has ever been a way or ever will be a way of handling the liquor problem to eliminate the disturbance of peace and the infringement of freedom and rights of innocent people caused by those immature ones who cannot handle their liquor, but who nevertheless are still allowed to consume it.

More power behind the Anti-Alcohol Bills for the sake of a finer, safer industry. *J. J. CAMERON, 1/Lt., USAF.*

More answers to puzzle

To the Editor:

Here is an answer to the area problem on page 99 of the August 12 issue which satisfies me, if no one else:

The parts of the square will not fit into the 5x13 rectangle as nicely as it would appear. A little figuring will show that the angles at the upper left and

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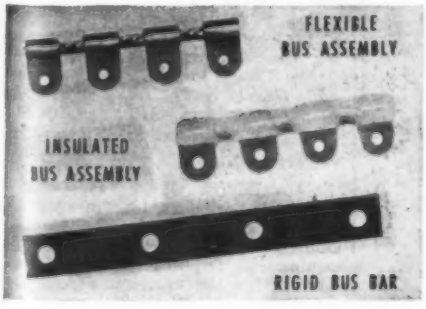

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lower right corners of the rectangle are not 90-degree angles as they should be.

If the rectangle is "squared up" as it should be, there will be a slight mismatch along the diagonal leaving a gap the area of which is obviously one square unit.

(For each of the corners: the tangent of the smaller angle equals 3/8 and the larger angle 5/2. Their sum is approximately 88 degrees 45 minutes.) *J. G. PACKARD, Station Manager, Western Air Lines, Scottsbluff, Neb.*

To the Editor:

In regard to the puzzle on the "Sidelights" page of the August 12 issue, it is disgustingly sneaky. The diagonal cut in figure number 2 appears to be a straight line, giving the impression that the four pieces fit smoothly together and thus making sixty-five square areas out of sixty-four. Actually there is a difference of about one degree in the angles of the two different type pieces which adds to the area of the overall figure when put together correctly and not as shown. I personally regard this a trick rather than a puzzle, since you have shown false rather than misleading or obscure information.

Please send the sixty-four thousand dollars to the above address. *ARTHUR W. BUNCE, Cedar Grove, N. J.*

To the Editor:

It took me a few minutes to recall some of my high school geometry to solve your puzzle of how 64 squares became 65.

Your triangles in figure 2 are actually quadrilaterals since the hypotenuses are not straight lines. To prove this, I relied upon the proposition that ratios of the same sides of similar triangles are equal.

In the upper left triangle of figure 2 the ratio is 8/3 while the ratio of the triangle constructed from the lower right portion of the right hand quadrilateral is 5/2. A ratio of 8/3 equals 2.888 while 5/2 equals 2.5. The difference between these two, the area added by mating the triangles into quadrilaterals, accounts for the extra square in figure 2. *W. J. CROUGHWELL, JR., Reservations Manager, American Airlines, Inc., San Francisco, Calif.*

To the Editor:

The solution to your puzzle in SIDELIGHTS (August 12, '57) is that there is an unaccounted for space between the pieces, as put together in figure 2. The slope on the pieces in the lower left and upper right corners is 2/5 or .4, while the slope on the pieces in the upper left and lower right corners is 3/8 or .375. If this difference in slopes is exaggerated it becomes evident where the "extra" area comes from. *EUGENE C. DEVINE, East Hampton, Conn.*

He's in the market

To the Editor:

In regard to George Shaw's article in the July 29 issue of AMERICAN AVIATION on one-man helicopters, I would appreciate your sending me as much information as you could about the Bensen Gyrocopter. I would also like to have the address of the manufacturer.

I am interested in learning more details about the Bensen Gyrocopter because I am contemplating the purchase of one. *R. GARY SMITH, Los Angeles, Calif.*

Worth reprinting, too

To the Editor:

I haven't had a chance to tell you how well-received Bill Beller's "lithium" article in the July 15th issue was; as a matter of fact, it was so well-received that our top management decided to have 8,500 reprints made for distribution to our stockholders. *WALTER M. FENTON, Vice President, Product Research and Development, Lithium Corporation of America, Inc., Minneapolis, Minn.*

Appreciation

To the Editor:

Don Berlin and our other executives were delighted with the fine story George Shaw did for AMERICAN AVIATION on our commercial aircraft, the Vertol 44 . . . Thanks for the excellent reportorial job. *EDWARD J. DOHERTY, Assistant to the President, Vertol Aircraft Corp., Morton, Pa.*

To the Editor:

I should like to take this opportunity to express my company's and my sincere appreciation for the very fine coverage given our efforts in the July 1 issue of AMERICAN AVIATION (page 41). I know reporting of this type will be of great benefit in molding public acceptance of amphibian flying in general, and our Model C-2 in particular. *DAVID B. THURSTON, President, Colonial Aircraft Corp., Sanford, Me.*

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SPOTLIGHT

The Allison Turbo-Liner has made more than 1,000 flights since it was converted from a Convair 240 to turboprop power in 1951. It has logged 1,800 engine and propeller hours. Engines used during the six-year period: Allison YT38, YT56, T56 and the commercial 501-D13, all driving Aeroproducts Turbo-propellers.

Boeing's XB-52, mounting two Pratt & Whitney J75s in place of outboard pairs of P&W J57s, is nearing first flight at Wichita. The 15,000-lbs.-thrust J75s will be equipped with afterburners. XB-52 is being used merely as high-flying testbed for the big engines. Plane will be delivered to USAF next month.

Autonetics, a division of North American Aviation, has been testing guidance and control systems components at 90,000 ft. with helium-filled balloons. Four flights were made under direction of General Mills, Inc., at New Brighton, Minn. Autonetics personnel designed and built a special gondola for the tests.

Contract to Goodyear Aircraft Corp. amounting to $76,105 for design study of its Convoplane VTOL (AMERICAN AVIATION, Sept. 9, p. 24) stems directly from Army, not Office of Naval Research.

Allison is not the only contender for Navy project to evaluate refitting of Convair R4Y-1s with turboprops (AMERICAN AVIATION, Sept. 9, p. 26). Program initially was proposed to Navy by British Napier firm for its Eland engine, but Navy wanted at least two bidders on the modification.

Grumman has officially named its Model 159 twin executive turboprop the Gulfstream.

First export Bristol Britannia has been accepted by El Al Israel Airlines. Aircraft was ferried Sept. 12 from Filton, England, to Tel Aviv with 24 passengers aboard including El Al chairman Gen. Benarzi.

Receipt by Texas Instrument Inc. of a $1.4-million order from Air Materiel Command for APQ-56 side-looking (lateral scanning) radar was in a competition with Westinghouse. Texas Instrument's design of the 3-D radar, which operates in three colors, reportedly was better from considerations of power, weight, size and performance factors than the competitive unit. APQ-56 makes extensive use of transistors.

Britain's Napier company is studying two small turbine engine derivatives of its Oryx turbo-gas generator. One is a free turbine intended primarily for helicopter applications. Other is a free turbine turboprop in the 850-1,000 shp bracket.

Temco's prototype TT-1 Pinto primary jet trainer has completed more than 470 flights. Company has delivered its first production model of an evaluation quantity of the two-place jets ordered by Navy.

Omitted from the supplemental appropriations bill, which included $32,632,000 for Navy and Marine Corps construction in the San Diego area, was $6,758,000 sought by Navy for developing the South Bay seaplane base. Some observers believe this to be indicative of the administration's attitude toward water-based aircraft.

General Electric CJ-805-3 jets (commercial versions of the J79) that will power the Convair 880 transport will be tested this winter atop Mt. Washington, N.H., mounted in a bell-mouth test stand built to Convair specifications by Rohr Aircraft Co. Test stand will be housed, with bell-mouth projecting into prevailing wind. Water spray will be used to create icing conditions.

Lear, Inc. is supplier of the air inlet control for Republic's F-105 Thunderchief. Control permits maximum engine efficiency in supersonic flight, allows fighter-bomber to perform at peak capability over a wide range of speeds. It also prevents shock waves from forming in the inlet duct; waves could "choke" the engine, engineers say.

FRENCH CHESSMEN FROM THE HERMAN STEINER COLLECTION. (12TH CENTURY)

STRATEGIC WEAPON—Closely shrouded in secrecy during years of development and testing, the Snark SM-62, like the powerful queen in chess, is an important strategic weapon. The Snark, America's first intercontinental guided missile, is now scheduled for delivery to the Strategic Air Command of the U.S. Air Force. Designed to deliver a nuclear warhead to a target 5,000 miles from its mobile launching platform, the Snark is a strong deterrent to any aggressor. Like the new Northrop T-38 supersonic jet trainer, the Snark was developed with Northrop's realistic understanding of national defense budget limitations. These, and other weapon systems designed and produced by Northrop, are examples of the continued corporate effort to aid the defense department in maintaining "security with solvency" by using the best resources of science and technology to develop low-cost solutions to defense problems.

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AIRTRENDS

Navy's ramjet Triton missile met the same fate last week that USAF's Navaho encountered earlier this year. But Navy had invested only $24 million in the 1,500-mile Triton at the time of cancellation, compared with the $690 million that USAF had put into the intercontinental Navaho. Navy will continue to support certain aspects of the project, notably guidance, for use in future missiles.

Triton was regarded as a highly promising system. But rapid development of the supersonic Regulus II and bright outlook for the Polaris Fleet Ballistic Missile squeezed it out. In this respect it was similar to Navaho, which was pinched off by the combination of the Snark intercontinental missile and the forthcoming Atlas and Titan ICBMs.

USAF decision to seek a WS-110A chemical bomber optimized for all-supersonic flight is the principal reason for startling design progress achieved by Boeing and North American during the last several months. Efforts of the companies have amounted to a "major technical breakthrough," said Lt. Gen. C. S. Irvine, USAF's Deputy Chief of Staff for Materiel.

The bold gamble for an all-supersonic WS-110A avoids the difficult design compromise which led to rejection of the companies' initial proposals last year. These envisaged a bomber that achieved maximum range during subsonic cruise, but which had an added supersonic dash capability for protection over target. The new designs would get maximum range only in supersonic flight.

USAF's fiscal 1958 shopping list has been trimmed to less than 1,000 new planes as a result of recent Pentagon economy drive. This is a cut of more than one-third from the 1,515 aircraft USAF originally planned to procure. As of last week, the Pentagon had not yet okayed the USAF plan—or those of the other services. Result: a complete dearth of military procurement activity and increasing uncertainty for contractors looking for military orders.

Congressmen are committed, tentatively, to at least two post-adjournment investigations affecting the industry. House Manpower Utilization Subcommittee, headed by Rep. James C. Davis (D-Ga.), is scheduled for a November look at defense industry personnel problems. Hearing may cover costs of hiring technical defense workers, which Davis thinks are too high. Moss Information Subcommittee will resume its war on Defense Dept. information policies. Subcommittee investigators have been denied access to Pentagon files. Rep. Moss can be expected to use this as a weapon in renewed hearings.

Watch for Congressional action next year that may kill Defense Dept. power to issue advance payments on contracts under Title 2 of the War Powers Act. However, insiders say the move isn't as serious as it seems, since DOD will probably insist on obtaining similar authority from Congress before relinquishing Title 2.

Senate Judiciary Committee is critical of broad wartime powers that allow DOD to amend contracts, make advance payments and extend delivery and completion dates. It will fight for tighter restrictions. Progress payments, apparently, aren't involved. DOD claims it has other powers to grant these and has assured Senators it won't invoke Title 2 in such cases. The committee, which reluctantly okayed a one-year extension of the act, leading to last-minute passage, also got assurance that no new contracts would be negotiated under Title 2. Committee approval was prompted by the fact that more than $20 million in past claims are pending.

DIGEST

Reliability and maintainability will govern future USAF electronics budget, Rawlings warns

LOS ANGELES—Air Materiel Command chief, Gen. Edwin Rawlings, gave electronics industry leaders the encouraging forecast of an increasing share of Air Force dollars, but warned that the extent of USAF's shift to electronics will depend largely on the industry's ability to produce more reliable and maintainable equipment.

In a key address before the Electronics Industries Assn. (formerly Retma), Rawlings said it is his studied opinion that the industry can look forward to an even greater shift in importance in the overall business of the Air Force. There already has been a decided shift in the procurement pattern.

Only a few years ago, the procurement chief noted, the cost of electronics amounted to but 10% of the Air Force budget. Today, electronic procurement comes closer to 20%, or in the approximate magnitude of $3.5 billion.

RAWLINGS

"To me it is obvious that this percentage will continue to increase in the years to come, particularly as we place more and more emphasis on missiles and unmanned weapons of various kinds," Rawlings said.

But, he cautioned, the extent of this shift toward electronics will depend, to a large extent, on the manufacturers' ingenuity in solving the problems of reliability and maintainability.

In their current state, Rawlings said, these pressing problems facing both electronics producers and the using military services form a rather dark picture.

"Aircraft or missiles that are on sick leave when the bell rings won't help us . . . In fact they will be a distinct liability," he told the EIA session. "Perhaps you are as tired of hearing about reliability as we are of repeating it," he continued, "but we will stop talking about it only when we are able to get electronic equipment with the degree of reliability we must have. I am talking about perfection, or an extremely close approach to it."

"We can't afford anything less," the top AMC official said, "and we can apply only one test: whatever the product, if it doesn't work when we need it, we can't use it. We cannot afford to have a $5-million aircraft out of commission for lack of a $10 part."

Cites cost study

Rawlings cited a recent study which shows that the cost of maintaining electronic equipment in the USAF is about twice as much per year as the first cost of the equipment. He said a Navy estimate expressed the same thing over a different period, indicating that maintenance cost during the life of such equipment is about 10 times its first cost.

The AF official considers these "disturbing figures" when it is considered that billions are spent each year by these two services for purchase of electronic devices. He also labeled these maintenance costs "pretty grim" when compared with the cost of maintaining electronic equipment being produced for commercial customers.

Specifically, he cited the case of the $700 color TV set which sells with a one-year service policy for $100—or about 15%. Rawlings conceded that he wouldn't expect this unit to operate in an oven, nor to be dropped on a concrete runway at 125 mph, but simply warned industry the comparison indicates there is room for improvement.

With the constant increase in electronics purchases each year, he said, the USAF cannot tolerate such skyrocketing maintenance costs.

One-third of USAF personnel are engaged in maintenance, Rawlings said. In the use of some of today's aircraft, readiness of the airplane for a mission may be determined more by availability of maintenance facilities and skills than by the number of planes, he pointed out.

As an example, he cited one complex airborne electronic equipment installation that requires three hours of maintenance for every hour in the air. "Obviously," he pointed out, "increased reliability, simplicity and maintainability can pay large dividends, not only in economy, but in combat effectiveness as well."

Rawlings conceded that the twin problems of reliability and maintainability are not easy to solve. If a manufacturer waits and tests and debugs long enough, he might wind up starting production on something completely obsolete.

And he also concedes that the Air Force, on occasion, has contributed to the problem by demanding and accepting systems of great potential for which time had not been allowed for reliability engineering.

Crucial consideration

The AMC chief warned, however, that unless significant gains in reliability are made, "we may well be approaching the time when we cannot introduce into production those systems which have not been engineered and pre-tested for reliability."

This, he feels, will be an extremely difficult decision to live with in view of the vital need for the earliest possible superior weapons.

However, Rawlings said, we must accept the fact that, where we do not have reliability, we do not have the ability to fight.

Lockheed's JetStar makes first flight

AMERICA'S FIRST jet utility transport completed its first flight Sept. 4. Prototype is powered by two aft-mounted Bristol Orpheus engines developing more than 10,000 lbs thrust. A second prototype will have four General Electric J85s or Fairchild J83 engines. Aircraft cruises at 500 mph at 40,000 ft. Span is 53 ft., length 58 ft.

Convair offers wingtip jet version of 340 and 440 to compete with current turboprop transports

A jet version of the Convair 340 and 440 is being offered to airlines under a program sponsored by Convair, AMERICAN AVIATION has learned. The program calls for the fitting of wingtip jets to increase speed, payload and climb characteristics and to reduce take-off field requirements.

The four-engine version of the 340/440 is designed to make the Convair fully competitive with current turboprop transports. It could enable the aircraft's life as a first-line transport to be extended for many more years.

Convair is actively presenting its jet Convair-Liner proposal to operators of 340s and 440s. Executive aircraft owners are reported to be among the best prospects, but at least two European airlines are actively considering adopting the modification. The addition of the jets would cost about $150,000 for a kit (including two jet engines) plus labor. The actual modification work is said to be small.

Two types of jet engines are offered for installation—the Fairchild FT-101E (J44) and the Continental 352-2(J69). Engines are mounted in conventional three-point arrangement from a saddle-shaped portion of the upper nacelle structure, which is permanently attached to the wingtip. The rest of the nacelle is supported from the engine and can be lowered to a ground dolly as a unit with the engine. This allows rapid engine/nacelle change.

Wing modification consists of strengthening part of the spar boom by means of heavier gauge material in spar webs and skins and spar rail reinforcement. The fuel tank is extended outboard and capacity increased to 2,000 gallons.

The increased fuel capacity requires enlargement of the oil tanks for the P&W R2800 engines. The jets have separate oil systems. The J44 uses a nonrecoverable oil-spray type of system which does not require an oil cooler. Its oil tank is contained in the engine. The size of the tank will be increased to allow for longer operation. The J69 requires a separate oil tank and a small amount of oil cooling.

Since the jets may be inoperative during some stages of flight, a method of preventing windmilling drag is required. The system proposed for this installation utilizes two inlet shut-off doors pivoted from a vertical strut. The doors rotate forward 45 degrees on each side to close off the inlet. This forms a "chisel-edged" nacelle nose preventing ice build-up.

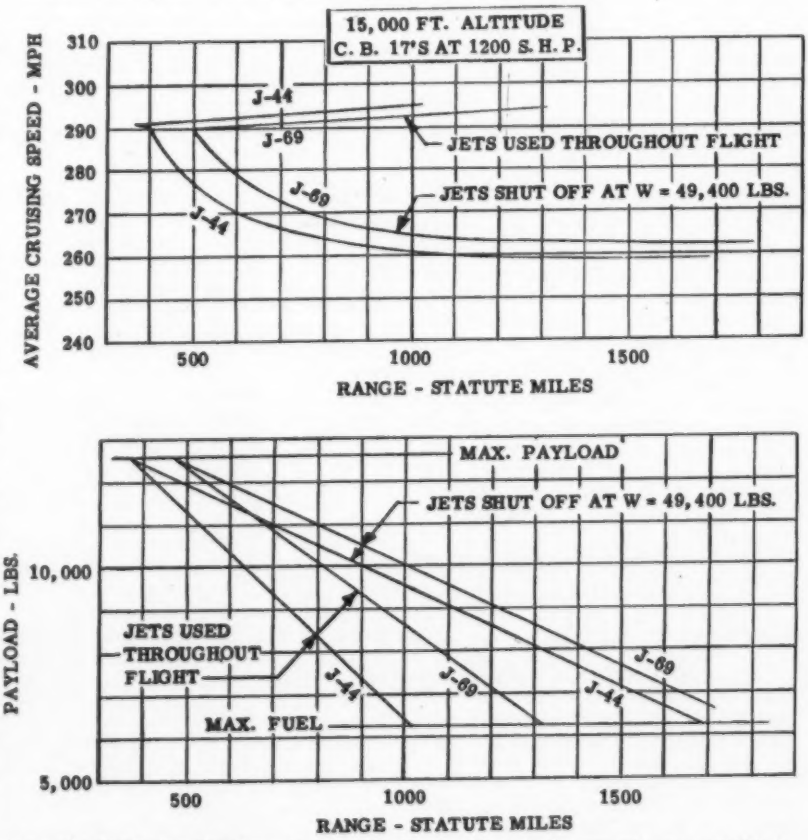
Few cockpit modifications are required. A throttle for the jets is added to each side of the pedestal between the R2800 engine throttles. A switch panel is added overhead just below the existing engine control panel and a group of four small instruments are added just above the upper sill.

Performance specs of Convair 440 with wingtip jets

C.A.R. Performance		With J44s	With J69s
Critical take-off runway length			
(a) Standard day, sea level		4,400 ft.	4,450 ft.
(b) Standard day, 5,000 ft.		6,050 ft.	6,100 ft.
(c) Standard + 40°F, sea level*		4,800 ft.	4,850 ft.
(d) Standard + 40°F, 5,000 ft.*		6,550 ft.	6,600 ft.
Rates of climb with one CB 17 inoperative standard day:			
2nd and 3rd take-off segment (15° flap)			
sea level		630 ft./min.	620 ft./min.
5,000		465 ft./min.	460 ft./min.
Rates of climb, all four engines on standard day:			
Landing configuration (40° flap) takeoff power	sea level	1,010 ft./min.	1,000 ft./min.
Landing weight	5,000 ft.	725 ft./min.	715 ft./min.
Landing field weight intended	sea level	4,380 ft.	
	5,000 ft.	5,020 ft.	
Non-C.A.R. Performance			
Rates of climb at sea level on standard day			
Reciprocating engines at max. continuous power		1,370 ft./min.	1,330 ft./min.
Jets at normal rating			
Reciprocating engines at 1,450 bhp			
Jets at normal rating		1,000 ft./min.	940 ft./min.
Time to climb to 20,000 feet at 1,450 bhp		26.5 min.	27.5 min.
Distance covered in climb at 1,450 bhp		96 miles	90 miles

* Half accountability

How Convair 440 with wingtip jets performs



Range/payload data for Convair 440 with tip jets. Data is for operations at 15,000 ft.

Australia to buy C-130s

Royal Australian Air Force purchase of a dozen Lockheed C-130 Hercules turboprop transports for delivery in 1958 was imminent last week. Cost is in excess of $35 million, including spares, crew training and support equipment. First of the RAAF C-130s will be delivered in October and the last of the 12 in December 1958. Delivery will be from Lockheed-Marietta.

BRIEFS

Military-manufacturing

Servomechanisms, Inc., has been awarded a $1,894,000 production contract by Hughes Aircraft Co. for a barometric altitude controller. The BAC, which can measure aircraft or missile deviations as small as two and a half feet at sea level, is result of three years' development.

Mallory-Sharon Metals Corp. has been formed as the largest integrated company in the special "nuclear-missile-age" metals industry with assets of more than $55 million. Owners are P. R. Mallory & Co., Inc., Sharon Steel Corp., and National Distillers and Chemical Corp.

Goodyear Aircraft Corp. has received a contract in excess of $1,100,000 to incorporate engineering changes and flight-testing of guidance systems for the TM-61B Matador missile.

Navy has laid up six of its 10 Convair R3Y Tradewinds flying boats as an economy measure. The four remaining will be used for aerial refueling and other experimental tactical operations.

Navy has ordered an additional test quantity of Beechcraft XKDB-1 medium performance target aircraft for flight evaluations at the Naval Air Missile Test Center, Point Mugu, Calif.

Three west coast firms have formed the National-El Ray Co. to manufacture electrical and electronic components. Forming the firm are El Ray Motor Co., Valco Engineering Co. and National Electronics Corp. Headquarters is at North Hollywood, Calif.

Northrop Aircraft has delivered the first KC-135 aft fuselage section to Boeing 21 days ahead of schedule. Company received the subcontract late in June, was to have delivered first unit September 20.

Thomas Wolfe has been appointed executive director of the Aircraft Service Assn. Wolfe recently had resigned from the Defense Department to form Thomas Wolfe and Associates.

Exclusive license for development of the French Radio-Web Navigation System (AMERICAN AVIATION, May 1956) in the U.S. and Canada has been obtained by Stavid Engineering, Inc., Plainfield, N. J. according to Stavid it will seek development contracts for U.S. military trials of Radio-Web and already has made a system proposal to the Army for helicopter use.

Financial

Ryan Aeronautical Co. reports net sales of $46,244,618 for the nine months ending July 31 compared with $33,023,043 at the same time last year. Earnings for the first three quarters of the company's fiscal year were $1,076,330 or $2.88 a share, up from $2.44 last year at the same time.

Northeast Airlines reports a gain in operating revenues in July this year, $1,612,401 compared with $1,117,115 in July 1956, but realized a net loss of $153,602 in contrast to a profit of $90,138 last year.

Robinson Aviation, Inc. reports improvement in operating results for the fiscal year ended June 30. Income after taxes was $214,966 or 68¢ a share compared with $115,189 or 26¢ a share last year. Gross income was $4,499,500 up from $3,107,332.

Hawaiian Airlines realized net earnings of $197,253, equal to 56¢ a share for the year ended June 30. Last year the line lost $174,632. Revenues for the year were $5,599,397.

Qantas Empire Airways reports net profit for 1956 of £484,000 ($1,084,160) compared with £401,000 the year before. Revenue was £15,834,000 ($44,428,160) compared with year before's £15,975,000.

Transport

Pan American World Airways will fly 37 Navy and civilian passengers to the Antarctic in mid-October. Boeing Stratocruiser will be used for the flight which Navy says may demonstrate the feasibility of commercial air operations to the only remaining continental frontier.

Braniff Airways and the Air Line Pilots Assn. have averted a strike and reached agreement. Details were not released but the issues settled included a retirement program, working rules and improved rates of compensation.

Joseph J. O'Connell, Washington attorney and former CAB chairman, was elected board chairman of Lake Central Airlines, succeeding Dr. R. B. Stewart, who asked to be relieved of the chairmanship for personal reasons. Stewart remains as a director and member of the executive committee.

Ralph E. Rechel was named to the new post of administrative assistant to the president of the Air Transport Association. He has been senior economic and operations analyst and assistant to the director of ATA's research department.

Pacific Western Airlines Ltd., Vancouver, Canada, bought two DC-4Es from an undisclosed seller for $1.2 million. Planes will be used on the company's DEW-line re-supply contract.

Max Hymans was re-elected board chairman of Air France.

KLM Royal Dutch Airlines opens its recently-authorized New York-Curacao nonstop service Oct. 11.

Northwest Airlines on Sept. 29 starts the first DC-7C transcontinental nonstop service. One daily flight will operate New York-Seattle another New York-Portland. Equipment will be combination tourist-first class.

TWA and Northwest Airlines on Jan. 1 will start round-the-world service, made possible by CAB extension of TWA's route beyond India and Ceylon to Bangkok and Manila, where connection is made with NWA. Westbound, NWA's daily service will go to Seattle and Tokyo and from Tokyo three times weekly to Manila. Eastbound, TWA will fly daily to Rome and Athens and twice weekly beyond to Bombay, Colombo, Bangkok and Manila. DC-7Cs and Super-G Connies will be used.

Riddle Airlines has signed an 18-month contract with its 220 Air Lines Pilots Assn. pilots. Under terms of the agreement, a joint participating retirement plan will be established. Agreement runs until December 31, 1958.

Civil Aeronautics Board has granted an exemption under which Slick Airways would sell its 13 C-46 aircraft to AAXICO Airlines and lease back 10 of the aircraft. AAXICO will pay $1,152,000 and Slick will pay rentals of $576,000.

France lifts ban on PAA polar route to Paris

A tense bilateral situation between France and the U.S. appeared to ease slightly at presstime as the French removed an earlier ban on Pan American World Airways inaugural polar route flight to Paris.

But there were no indications whether or not France would permit continued scheduled polar route flights of PAA or Trans World Airlines unless the U.S. agrees to negotiate for a reciprocal polar route for Air France. PAA's service from the U.S. west coast to Paris opened Sept. 13; TWA's is scheduled for Sept. 29.

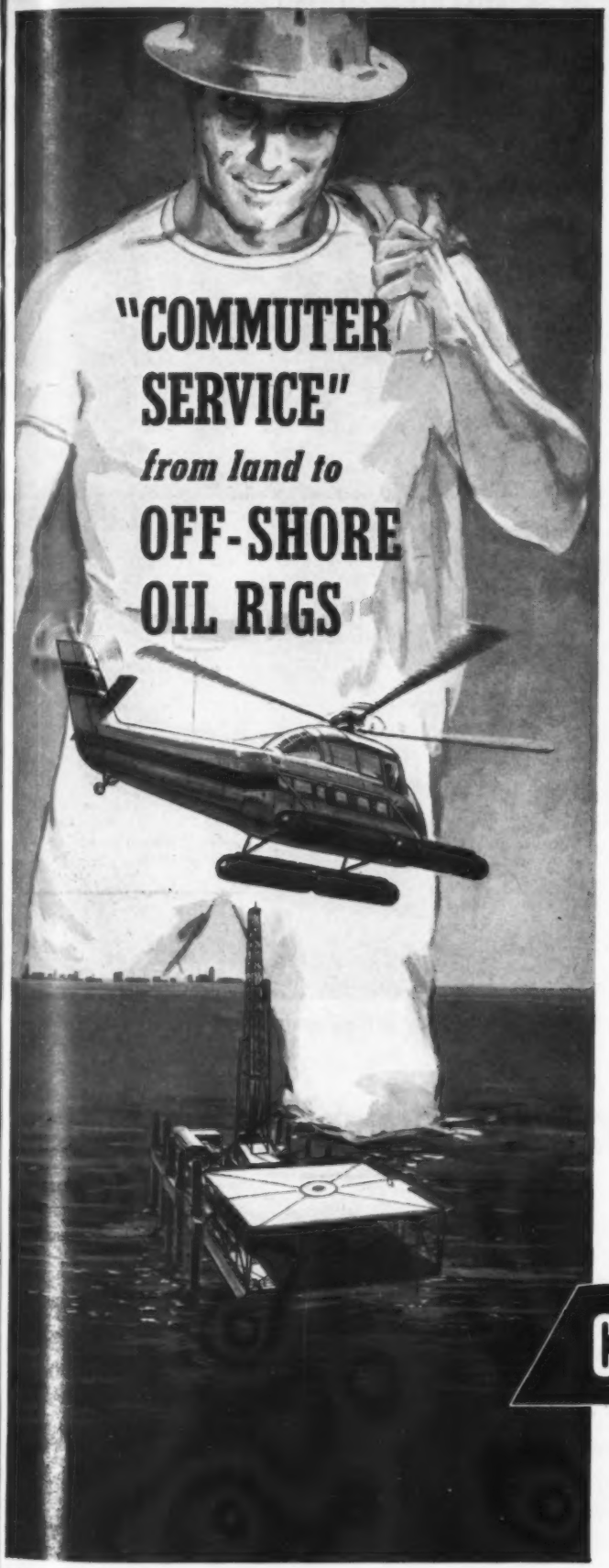
When the French announced one week before PAA's inaugural that they would not permit the flights to land in Paris, initial U.S. airline reaction was to terminate all reciprocal air services between the two countries rather than give in. U.S. objections were based on an interpretation of the existing agreement that indicated polar route operations of Pan Am and TWA were permitted by the agreement.

France claims it does not want a full-scale bilateral negotiation, only one limited to a polar route for Air France.

PAA to cut service to Alaska starting Sept. 29

Pan American World Airways will reduce Alaska service starting Sept. 29 to trim heavy operating losses. Number of employes at Seattle-Tacoma International Airport will be cut from 248 to 167. Virtually all of these displaced at Seattle are being assigned elsewhere in PAA's Pacific operations.

E. E. Swofford, PAA director in Seattle, said the company is "losing a substantial amount of money in Alaska. It seems only prudent to shift some of the cost of maintaining the Alaska-sector Stratocruisers to the engine-and-overhaul base already in full-scale operation in San Francisco."



CYCLONE 9 powered SIKORSKY S-58s fly in world's largest ferrying operation

Offshore oil development moves at a rapid pace in the Gulf of Mexico, where Humble Oil & Refining Company operates the world's biggest helicopter ferrying operation. Last year, more than 85,000 passenger trips were made from Grande Isle, Louisiana just carrying employees to the fifteen Humble drilling rigs in the Gulf. Latest additions to Humble's fleet of helicopters are four giant Sikorsky S-58s, powered by specially adapted, advanced models of the Curtiss-Wright Cyclone 9 engine.

The trip from shore to rig used to take four or five hours in a lumbering workboat. Now it's a pleasant half-hour hop. And the same transformation — from time-consuming, drudgery surface travel to quick by-air connections — is the pattern wherever Cyclone 9-powered 'copters are put to work. In military service, in airport-to-city helicopter airlines, in rough-terrain rescue and supply work, in messenger and delivery service for industry, the modern helicopter has assumed its rightful stature and is steadily increasing in importance in today's transport picture.

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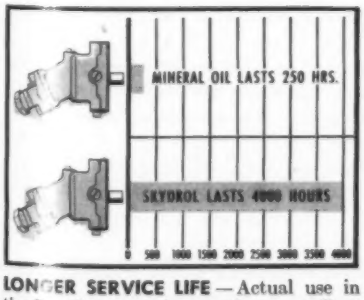

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SEPTEMBER 23, 1957—VOL. 21, NO. 9

AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Industry reacts . . .

AIA head says cutbacks not cataclysmic; cautions acceleration will be difficult once brakes are applied

THE AIRCRAFT INDUSTRY has warned that while the situation is not "cataclysmic" as the result of recent military cutbacks and stretchouts, caution should be used in applying the brakes to production.

Gen. Orval R. Cook, president of Aircraft Industries Assn., told the Aeronautics Committee of the American Legion that, once the brakes are applied, it will be difficult to get the industry back into full swing in an emergency.

In a speech at Atlantic City, Cook also said it may be necessary for prime contractors to pull back some of their subcontract work to take up the slack in their own plants.

On this point, the AIA head declared:

"In the past year, subcontracts of the larger airframe companies have run from 30% to as high as 60%. It is to be expected that, as the work load decreases for airframe and engine companies, there will be pull-backs, even though the armed services have said that economy and efficiency will be the determining factors."

"It makes little sense that a manufacturer whose facilities and work force are not fully occupied would continue to farm out work, if he can do the job better and at lower cost," Cook said. "Chances are he can."

Most economical procedure

Top-ranking Air Force officials have warned the aircraft industry against withdrawing work from their subcontractors in order to keep their own plants busy, but they have qualified this with the admonition that the most economical procedure is to be used in all cases. Thus, if a prime contractor who originally designed and engineered the products can produce them more cheaply than a subcontractor, it is to be expected that the prime will assume the production task himself.

Discussing the recent wave of military cutbacks and cancellations which has struck the aircraft industry, Gen. Cook made these points:

ORVAL R. COOK
Gives industry views on military cutbacks.

"In the first place, nothing cataclysmic has happened."

"We will suffer shortly a sharp and sudden drop in our business, but we still have a big job to do . . . we must make some important readjustments."

"This industry has never concerned itself with military requirements. That rests in the judgment and experience of the military services."

"We recognize fully the need to maintain an economic balance in building our armed forces . . . feeling it would be as disastrous for our country to be ruined economically as it would be militarily."

"We agree entirely with the military services that their job is to defend America, not to support any segment of our industrial complex . . . The industry has always been competitive, and it will continue to be."

But while the AIA executive made it clear the aircraft industry does not oppose the recent actions of the Administration, he also voiced this word of caution:

"No matter what expediencies may be dictated by our fiscal situation, we should not lose sight of the fact that we are faced by a most formidable and implacable enemy. He has surrendered nothing at the council tables. He boasts of his advanced air armaments, and we have very little reason to doubt that he has them. He speaks as from a position of strength."

Gen. Cook said the aircraft industry, as in the past, will supply what the military requires as quickly as possible and at the lowest feasible cost, but he added this reminder: "Once the brakes have been applied to this complex industry, acceleration is not a simple matter."

The recent series of cutbacks, personnel and overtime restrictions and other steps taken by the Pentagon to hold down military spending have come at a time when the industry is shifting the "mix" of its products, Cook said. Guided missile business has become increasingly important in taking up some of the slack caused by the aircraft reductions, he said.

Missiles for industry

The AIA executive said the pilotless missile has been developed chiefly by the aircraft industry and said it is "quite natural" for the aircraft industry to continue with this activity.

"It is reasonable to expect that the industry which brought the airplane to its present advanced estate should develop and produce missiles most efficiently and at lowest over-all cost," he said.

"I say this because there has been some disposition to place missile development in government arsenals and with universities and other tax-free institutions. We do not believe in that. This is a natural function of the aircraft industry and should remain with it . . ."

He added, however, that he does not advocate the complete elimination of arsenals and universities from the aircraft and missile field. "They have a

most important part to play in testing and in basic research," he declared.

As for the future, Gen. Cook forecast earlier military decisions on parallel development projects, even in the case of the intercontinental- and intermediate-range ballistic missiles. He said the cancellation of the North American Navaho after the investment of $690 million in its development may prove to be only the first of many similar decisions.

"The industry has been told quite frankly that the services will not require facilities which cannot be used to best advantage in the reduced program," he said. "For example, there will be a sharply diminishing use for the high-bay factories the industry has employed in large-plane manufacture, since there will be few large military planes in the future."

Companies negotiating contracts involving progress payments will not receive as much money from the government during the course of their projects as in the past, he said. This will force contractors to make up the deficit in bank borrowings, "even though interest on such loans is not admitted as cost of contract and must be taken out of earnings."

He also noted all companies will trim their work forces 5% by Oct. 31.

"There is no question that the effects of these changes will be selective to a large degree," Cook stated. "Some companies and some communities are going to feel them more than others, although austerity will be the watchword throughout the entire airframe, engine and components industry."

New rocket, prop Navy target drones in action

BEECH AIRCRAFT'S XKDB-1 is shown being ground-launched from a compressed air catapult at the Naval Air Missile Test Center, Point Mugu, Calif. The 600-lb. craft reached an altitude of 38,500 ft. It is powered by a 120-hp turbo-supercharged 6-cylinder McCulloch engine. Speed is 320 mph, span 12 ft.

TEMCO'S ROCKET DRONE XKDT-1 made its first flight recently at the Naval Air Missile Test Center. The target drone can operate up to 50,000 ft. at "near the speed of sound." Length is 12 ft., span 58.8 in., diameter 10 in. Drone was air launched at 20,000 ft. by F3H-2M Demon, held a straight course eight minutes.

Symington again warns that Reds lead U.S.

Sen. Stuart Symington (D-Mo.) charged that the Soviets are "well ahead" of the U.S. in developing the intercontinental ballistic missile and accused the Administration of cutting back expenditures for ICBM development.

He told a press conference the Administration has been withholding legitimate information from the American people and demanded more "candor" from the White House, in this respect, he cited contradictory information he had received from government officials before and after the Soviet ICBM announcement in August.

The Missouri lawmaker said he favors immediate U.S. production of an intermediate-range missile to counter Soviet progress. "If the Jupiter is the best missile, and from what I hear, it is, I would favor going ahead with it," he said.

Symington sharply criticized news stories suggesting that the U.S. has an effective anti-ICBM missile "around the corner or only five years away." Such reports are "absolutely false," he declared, and said: "An effective anti-ICBM is at least ten years away, if it can be attained at all."

Symington, who has been the leading Democratic opponent of Administration defense policies, said he would favor increasing the U.S. national debt limit of $275 billion if necessary to insure that this country matches Sino-Soviet military strength. But he emphasized that he does not really think such action would be necessary.

If the Pentagon were reorganized along the more progressive lines recommended by the Hoover Commission and the Cordiner group, and if it had a "true weapon systems evaluation program," he argued, it might be possible to save enough money to finance a vastly stronger defense apparatus within present budget limitations.

Stretchout for F-102A

Convair has announced that a stretchout of the F-102A interceptor was ordered by the Air Force early this summer in line with the Pentagon directive restricting overtime payments to contractors.

The action involves the postponement of delivery of a quantity of the aircraft by about two months but does not affect the total number on order.

Diversification boosts Hayes' sales to $55 million

by Henry T. Simmons

EARLY THIS MONTH, an Air Force KB-50 tanker let down at Birmingham, Ala., destined for a new and important modification at the hands of Hayes Aircraft Corp.

The tanker is the first of the Tactical Air Command's fleet of KB-50s to be equipped on a "production line" basis with a pair of General Electric J47 turbojet engines.

Slung on pylons beneath each wing, the 7,000-pound-thrust engines will give the tankers added altitude and speed performance while transferring fuel to TAC's growing family of Century series fighters and fighter-bombers. Result: More range for the fighters with a minimum new investment in tankers.

The KB-50J assignment is the second major modification to be undertaken by Hayes on Boeing-built B-50 (itself an outgrowth of Boeing's B-29). The Birmingham company is just winding up the modification of the last of TAC's B-50s to the three-point probe-and-drogue refueling configuration of the KB-50.

The KB-50 tanker work is only one line of activity presently conducted by the six-year-old Hayes Aircraft Corp. Other overhaul and modification work includes such aircraft as the B-25, WB-50 weather aircraft, C-119 assault transport and the KC-97 tanker of the Strategic Air Command.

Hayes is swiftly branching out into new and diversified fields, including the design and manufacture of instruments, electronic retrofits and even the manufacture of school and industrial lockers. It is placing increased emphasis on helicopter maintenance and overhaul, and hopes eventually to attract jet aircraft IRAN and modification work from the Air Force.

Other activities include contract maintenance support for 333 helicopters and 257 fixed-wing aircraft operated by the Army Aviation School at Fort Rucker, Ala., design and development of special tooling for the Redstone Arsenal, and research work in the guided missile area, with emphasis upon infra-red guidance and countermeasures.

REMOTE UHF channel selector, designed, developed and produced by Hayes.

Another activity that emphasizes the diversification of the Hayes plant is its Technical Publications Section—with a staff of 400 writers and illustrators—producing T. O. literature for defense installations both in the United States and abroad. In addition to the Birmingham plant, this section has branches in Rome, N.Y., and San Antonio, Tex.

In an industry that has been notable for its pitfalls in the past, Hayes' performance has been little short of spectacular.

Formed in 1951, the company took a 30-year lease with the City of Birmingham on a government-built plant under a recapture clause and proceeded to de-mothball 125 B-25 aircraft under an Air Force contract. It had a total of 400 employes that year and its business totaled $750,000.

Today, Hayes employes approximately 10,000, including about 1,000 at Fort Rucker. And when it closes the books Sept. 30 for its present fiscal year, it expects to show total sales of $55 million to $60 million.

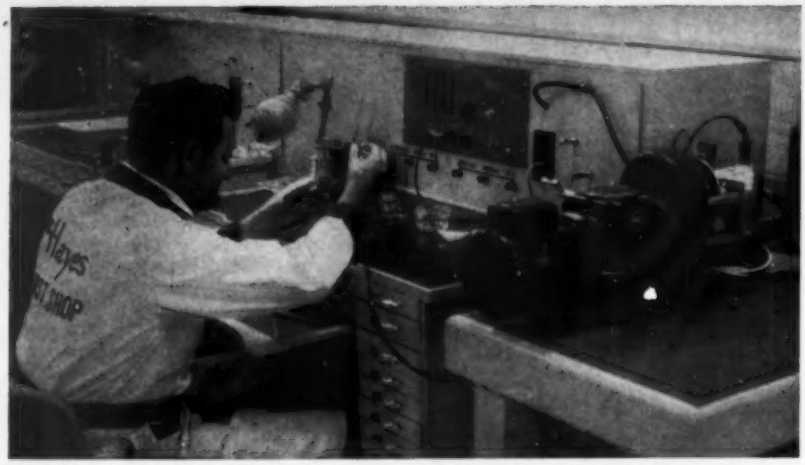
Hayes is not immune to the economy drive that has swept over the military services. None of its officials expects the company will continue its phenomenal rate of growth in the immediate future. Maintenance and overhaul work anticipated on the B-25 and KC-97 has failed to materialize because of the USAF money shortage this year. A 5% reduction in employment must be undertaken in line with the Air Force's recent cutback request to its contractors. This means the immediate pressure is downward on Hayes' employment.

Moreover, the company expects increased competition for the diminished amount of overhaul business which will be available. This will come from established contract maintenance concerns as well as from prime aircraft contractors and subcontractors.

Lewis F. Jeffers, Hayes president, expressed little concern about the future. He said the company will continue to direct most of its maintenance effort in the military field.

"While some overhaul and modification work is going back to the primes on account of the military cutback, I think in the end the low cost demonstrated by Hayes will keep it in that business for many years to come," Jeffers said. "In fact, I think it is more important to have a healthy, independent maintenance

PROTOTYPE KB-50J modified by Hayes with two General Electric J47s mounted in pods under wing for auxiliary power.



HAYES' new instrument design, development, production and test laboratory.

industry when the number of new aircraft produced falls off."

As to the possibility of increasing its effort in the commercal field, Jeffers said: "We have been able to keep our organization fully occupied during the past six years with military customers. We have no inclination to move to another field if military customers can keep us fully occupied, although we may go into the maintenance of executive aircraft for commercial users."

The Birmingham company has stressed the establishment of an all-round engineering department during recent years. This has been one of the key factors behind its success in carrying out very extensive modification tasks and in expanding into new fields.

The company is presently manufacturing a UHF channel indicator of its own design for installation on cockpit instrument panels. The device will show the pilot the channel to which his radio is tuned even though the radio is located in a position making it difficult to see. Hayes expects to sell several thousand of these.

Another result of the company's engineering effort is a contract with the Army Transportation Corps for the provision of special maintenance studies on Army aircraft and helicopters.

Probably the most dramatic result of Hayes' engineering effort is the KB-50J modification. Target date for the completion of tooling was mid-September, with the first modification to start in October. The goal is modification of TAC's entire fleet of more than 100 KB-50s to the new configuration within one year.

The company has already completed one prototype of the new installation which is now flying. Based on data developed with this aircraft, it appears that the tanker's speed can be increased by 45 to 55 knots, depending on altitude, while its altitude can be increased by 10,000 to 16,000 feet, depending on speed.

To TAC, this will mean it can refuel its supersonic fighters at upwards of 25,000 feet, a substantial improvement over previous performance.

Although the turbojet installation is a major modification, it is not as large a task as the initial modification of the B-50 to the KB-50, according to Glenn Jespersen, Director of Operations. The KB-50 required about 40,000 man-hours per aircraft and the installation of 22 miles of wiring; the KB-50J will require 10,000 to 15,000 man-hours and only about three miles of wiring.

Jeffers said the tanker modification program is a clear illustration of the value of the independent contract overhaul company.

"By virtue of the KB-50," he declared, "TAC is now mobile all over the world. For the price of eight or nine new tankers, TAC got a whole fleet of tankers. I think the Air Force demonstrated real economy on this program."

North American to close Fresno, Calif. division

North American Aviation, Inc., will close its Fresno (Calif.) Division by the end of the year when work on present contracts comes to an end. A total of 1,800 employes will be laid off at a rate of 600 a month as current work is terminated.

J. H. Kindelberger, NAA board chairman, said it would be "economically unsound" to continue the Fresno operation in view of the cutbacks in defense spending and the cuts in aircraft modification activity.

North American earlier had announced layoff of 668 employees at the Columbus, Ohio Division. This was the second large cutback at the Ohio facility since the reduction program began in mid-July. To date 1,978 have terminated at Columbus.

Layoff of about 500 more employes at Columbus is slated for this month. Engineers laid off total 300 to date and 100 more are expected to leave within a month.

Experts of four companies study nuclear test center

Four U.S. companies have established a group of scientists and economists to study the feasibility of building and operating a nuclear testing center with private capital.

Announcement of the Nuclear Test Study Group was made jointly by the companies involved—ACF Industries, Kaiser Engineers, Lockheed Aircraft Corp. and Phillips Petroleum Co. Headquarters is in Washington.

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American Airlines Orders Turbine Vibration Indicating Systems

Electras and Boeing 707s equipped with new Sperry Systems

When American Airlines takes delivery in 1959 of the first Lockheed Electras and Boeing 707s, these airliners will be equipped with the latest Sperry contribution to efficient operation of prop-jet and turbo-jet aircraft —the new Airborne Turbine Vibration Indicating System.

Measuring vibration in propellers and turbines, an indicator reports continuously to the crew from unique pickups located in strategic powerplant locations. An amplitude meter plus a signal light on the cockpit instrument panel give the crew advance warning if vibration in any of the four turbines or propellers approaches prescribed limits. Corrective action can be taken quickly by reducing speed of the affected engine or shutting it down.

Pay-off is maximum utilization of each turbine's power potential and more precise control of its operation. In addition, there is less chance of engine damage due to vibration, which in turn reduces maintenance and repair costs.

For full details on this new Sperry Vibration Indicating System, and the extra margin of operating efficiency it provides for both prop-jet and turbo-jet aircraft, write our Aeronautical Equipment Division.

AERONAUTICAL EQUIPMENT DIVISION

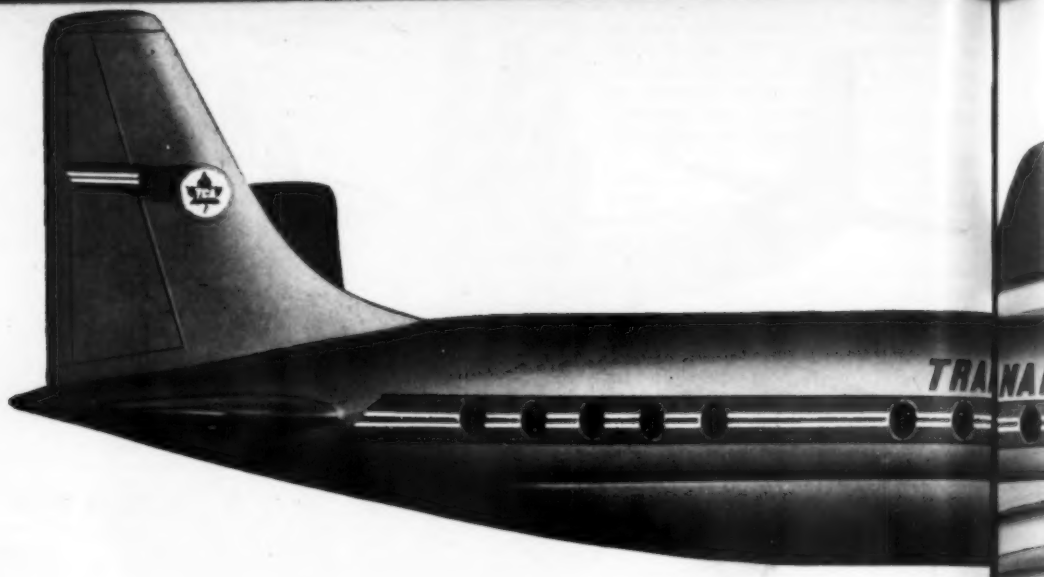
SPERRY GYROSCOPE COMPANY

Great Neck, New York

DIVISION OF SPERRY RAND CORPORATION

CLEVELAND • NEW ORLEANS • BROOKLYN • LOS ANGELES • SAN FRANCISCO • SEATTLE. IN CANADA: SPERRY GYROSCOPE COMPANY OF CANADA, LTD., MONTREAL, QUEBEC

Circle No. 111 on Reader Service Card.



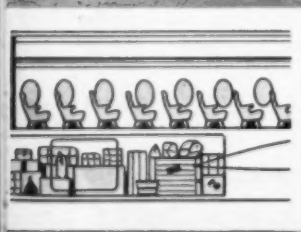
UNMATCHED OPERATIONAL

FLEXIBILITY

THE NEW DOUBLE-DECK JET-PROP **VANGUARD**

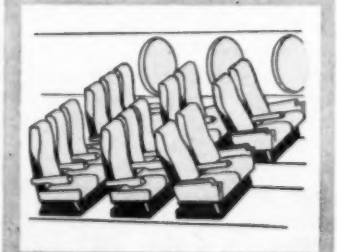
Without a doubt, the new Vickers Vanguard offers the greatest operational flexibility of any airliner ever designed. Though it is a de luxe passenger liner first and foremost, the Vanguard can, when required, operate profitably as an *all-cargo* plane! Result: the Vanguard is truly a *full-time* money-maker! Vanguards have already been ordered by British European Airways and Trans-Canada Air Lines. BEA ordered twenty. TCA also ordered twenty—with an option on four more—deliveries to start in early 1960. Into each Vanguard will be built over 2 million flying hours of Vickers jet-prop experience. And experience has no substitute!

2-IN-1 AIRCRAFT!



Because of its double-deck fuselage design, the new Vickers Vanguard is actually two aircraft in one! Though primarily a most economic passenger plane, it can also operate profitably as an all-cargo plane. Result: the Vanguard offers extraordinary operational flexibility—unmatched by any other airliner.

76, 86, 93, 120 PASSENGERS!

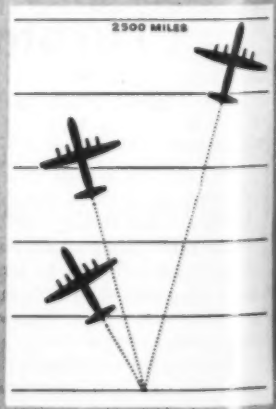


The Vanguard's luxurious upper deck passenger cabin features exceptional flexibility in layout . . . with capacities ranging from 76 for all first-class, up to 120 plus crew for all tourist — with mixed-class combinations in between.

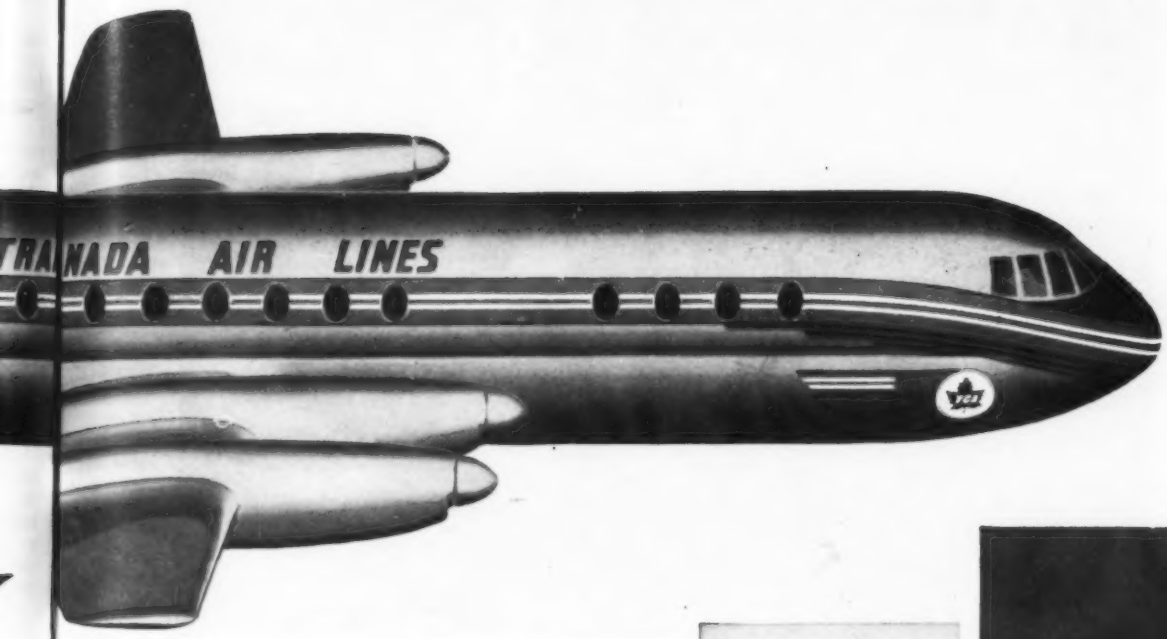
10 TONS OF FREIGHT!

The Vanguard's two huge lower deck cargo holds have a capacity of nearly 1400 cu. ft.—enough to carry 10 tons of freight with no modification in the upper deck!

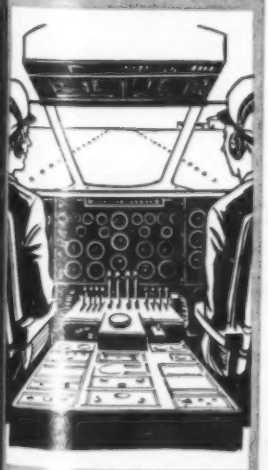
WIDE RANGE OF STAGE LENGTHS!



The Vanguard can be operated economically on short, high-density routes . . . first-class medium hauls . . . or all-cargo services over a wide range of stages. With full payload, the Vanguard has a 2500-mile range.



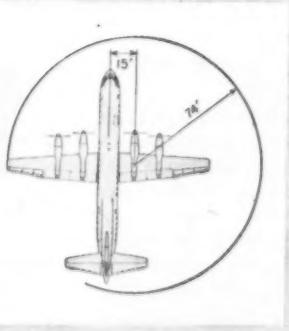
NO EXTRA-LONG RUNWAYS NEEDED!



The Vanguard offers great flexibility in routing... it can safely use the existing runways at most airports.

The Vanguard's spacious cockpit features simplicity and unsurpassed visibility.

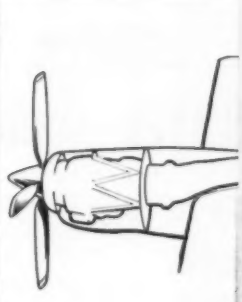
FASTER TURN-AROUND!



Special design features of the Vanguard cut time on the ground—lower operating costs to a minimum. A minimal turning circle of 74 feet, and excellent visibility that enables the pilot to see both outer engines and wing tips, mean the Vanguard can be taken in and out of the most crowded ramps safely and quickly.

Cabin doors fore and aft with built-in folding stairs assure rapid passenger handling. Extra-wide cargo-hold doors at truck level, permit simultaneous loading and unloading. With its low tire pressures, the Vanguard does not have to wait to use a particular part of the apron. All this gives the Vanguard more time where it should be— in the air!

GREATER SPEED, GREATER ECONOMY!



With four powerful Rolls-Royce Tyne jet-prop engines, the new Vanguard will be capable of speeds up to 425 mph. It will have a development potential for even higher speeds.

Years of experience and careful study have proved that for greatest economy over a wide range of stage lengths, the jet-prop is supreme.

U. S. REPRESENTATIVE:
CHRISTOPHER CLARKSON
10 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

jet-prop VICKERS VANGUARD

POWERED BY FOUR ROLLS-ROYCE TYNE ENGINES

VICKERS-ARMSTRONGS (AIRCRAFT) LTD.,
WEYBRIDGE, ENGLAND • MEMBER COMPANY
OF THE VICKERS GROUP

ACTUAL SIZE OF CONTROL PANEL

LIGHTER, SMALLER ADF WITH GREATER ACCURACY, HIGHER SENSITIVITY

NEW, COMPACT BENDIX DFA-70 HAS INCREASED EFFECTIVE RANGE, ELECTRICAL TUNING, FLUSH-MOUNTED ANTENNA

Bendix* ADF—long the "standard of the industry"—reaches another new high in performance and reliability with this new, improved DFA-70 system. Covering all frequencies from 90 to 1750 kilocycles, it provides both visual and aural navigation information, including narrow-band Consol reception. And with the greater accuracy and higher sensitivity that have been built into the system, a significant increase in operating range is obtained.

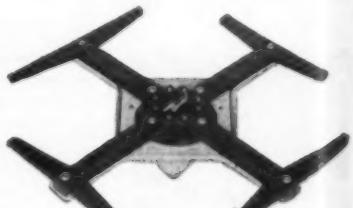
One of the important features of this new system is the electrical tuning which permits the Control Panel to be located as far as 50 feet from the receiver.

Another important feature is the newly designed flush-mounted loop antenna. With this new unit, precipitation static is greatly reduced and drag is completely eliminated.

For complete information and specifications, write Bendix Radio Division, Aviation Electronic Products, Baltimore 4, Md. Or West Coast—10500 Magnolia Blvd., North Hollywood, Calif.; Export—Bendix International Division, 205 East 42nd Street, New York 17, N. Y.

*REG. U.S. PAT. OFF.

½-ATR DFA-70 RECEIVER features sub-chassis construction, ARINC Class 1 ruggedized tubes, improved circuitry for minimum power consumption.



New LPA-70 flush-mounted loop antenna.

Bendix Radio Division

Bendix AVIATION CORPORATION

Circle No. 112 on Reader Service Card.

Report on Anglo-American Conference

TITANIUM, boundary layer control and the thermal barrier highlighted technical discussions at the 6th Anglo-American Conference, co-sponsored by the Royal Aeronautical Society and Institute of the Aeronautical Sciences, which convened for a week-long session in Folkestone, England.

Reporting on Douglas Aircraft's nine-year usage of titanium, company engineers, Leo Schapiro and Emerson Labombard said that during early DC-7 flights only nine parts made of titanium were known to have failed. This figure covered a four-year period and DC-7s containing 333 titanium parts per ship, about 450 pounds.

All failures were skin cracks. In several cases, the failures were attributed to excess hydrogen in the titanium, a condition that is now being taken care of by more rigorous procurement specifications. In another case, there was no deficiency in the material. Here, an engineering change to a heavier gauge was made.

The speakers said that their company's experience on the DC-7 program was sufficiently happy to lead to increased titanium use on later models of the aircraft. Model DC-7Cs now have 554 titanium parts weighing 800 lbs.

Further use of titanium will be seen in some of the structural material for the DC-8 turbojet transport. The engine shrouding and pylon are expected to use 600 lbs. of commercially pure titanium. Rib stoppers at frames and cut-outs are to use 330 lbs. of alloy sheet. Fifteen pounds of alloy forgings are expected to complete the titanium inventory on this aircraft.

Titanium price too high

When Douglas first began buying titanium, the material cost $20/lb., an arbitrary figure set by the producer to encourage the materials' use. For special sheet, the price was between $25 and $28/lb. Currently, Douglas is paying $19/lb. for sheet.

Despite the reduced price of the metal, the speakers said that using titanium for civilian aircraft was not economically justified, even where fabrication processes result in negligible waste of material. Nevertheless, Douglas is continuing using the metal in the hope that the manufacturing experience gained will help when titanium becomes cheaper.

National Advisory Committee for Aeronautics' engineer, Charles W. Harper, told of NACA's flight-test experience in applying boundary layer control to a series of North American F-86 airplanes.

According to Harper, the flight-test program had three major objectives: (1) to find out whether the areodynamic characteristics measured in the windtunnel would be realized in flight; (2) to obtain operational experience that might uncover unexpected or objectionable characteristics of boundary layer control; and (3) to discover pilots' reaction to BLC control.

Three F-86s were used for this work. In the first, leading-edge area suction was applied. In the second, area suction was applied to the trailing-edge flaps. In the third, the F-86 had its flaps modified to incorporate blowing-type BLC.

Windtunnel data valid

To realize the first objective, NACA investigated lift and drag requirements, trim characteristics, and air flow requirements. In general, it was concluded that the full-scale windtunnel tests were a valid indication of what would be found in flight.

Harper pointed out that NACA's operational experience with BLC on the F-86 was necessarily limited because of the small number of aircraft with which the agency was working. Bearing this fact in mind, he said, no operational or maintenance problems were found that were any greater than those routine to the operation of any aircraft. There was no special care needed for the area suction systems. At no time during some two years of research operation, he said, was it necessary to clean or replace the porous materials.

As an example, Harper told of an airplane with leading-edge area suction being flown into and out of a rainstorm. The angle of attack of the aircraft was above that for which maximum lift would be expected without BLC. In this case, the pilot found no loss in lift or any other indication that the BLC had lost effectiveness. It was concluded from this and other experiments that BLC will not result in new or difficult operational or maintenance problems.

NACA pilots reported that, when BLC was used, the stall warning was reduced below an acceptable value. However, the loss in stall warning was in part compensated for by an improvement in lateral-directional control and stability near the stall.

Harper said that satisfactory stall characteristics are harder to achieve as maximum lift is increased. Nevertheless, he reported, the stall of the F-86 with BLC on the leading edge was considered satisfactory, even though it gave a maximum lift coefficient almost 0.4 higher than any other device tested that had a satisfactory stall. Applying BLC to the trailing edge flaps produced no consistent change in stalling behavior.

He concluded that the altered span loadings resulting from the higher lifts of a trailing-edge flap with BLC will change the stalling characteristics. As a result, modification to the wing leading-edge may be needed to obtain a satisfactory stall if a conventional trailing-edge flap is to be replaced with a flap having BLC.

Windtunnel results and preliminary theoretical analyses were borne out when the pilots reported significant reductions in approach and landing speeds.

In the overall picture, Harper felt that the pilots were favorably impressed with the control of F-86 aircraft equipped with BLC.

Report on kinetic heating

James Taylor, head of the structure's research division Royal Aircraft Establishment, reported on the alleviation of kinetic heating stresses. He reviewed the fact that with increase in Mach number, there is some stage at which it is necessary to make either a major change in an aircraft's design or a change in the materials being used. He pointed out that when the temperature rises too high for steel, there is today no practicable alternate material that has adequate strength. Therefore, he concluded, the design must be modified.

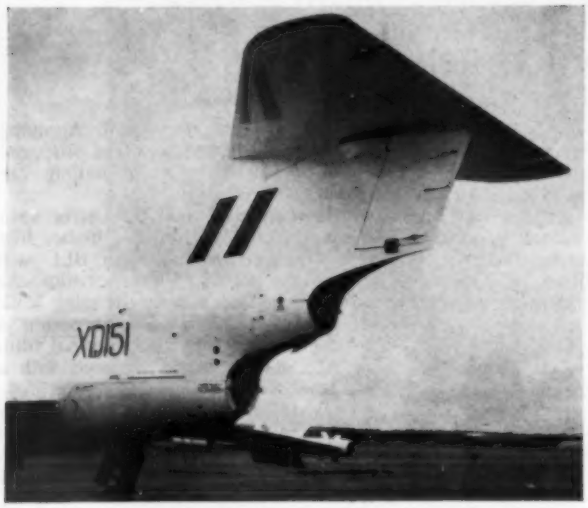
If it is decided to design against kinetic heating, Taylor said that insulation and cooling offer the only answers.

For his example, he considered an aircraft flying at Mach 5, where the equilibrium temperature is about 820° C if there is no cooling. Taylor drew on past studies to say that at 100,000 feet altitude it is possible with 1 kw/sq. ft. of cooling to reduce the temperature to 320° C without insulation. At 50,000 feet altitude, with the same cooling rate, insulation resistance of 450° C/kw/sq. ft. would be needed. This insulation would be between ¼- and ½-inch thick.

Harper recommended that once it is decided to cool the complete surface of the structure, renewed consideration should be given to aluminum alloys. Factors that should be considered are the disadvantage of the additional weight of coolant together with the advantage of having fewer temperature gradients, especially near the cockpit.

For radomes, however, care must be taken that the cooling design does not interfere with the radome's transparency to the appropriate electromagnetic waves.

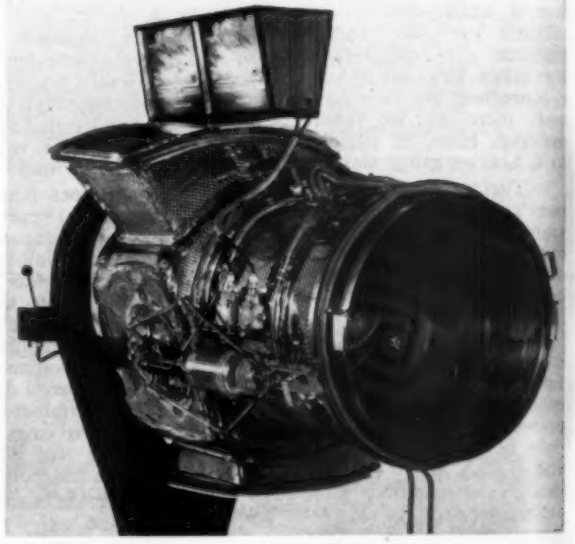
Closeup views of some Farnborough show features



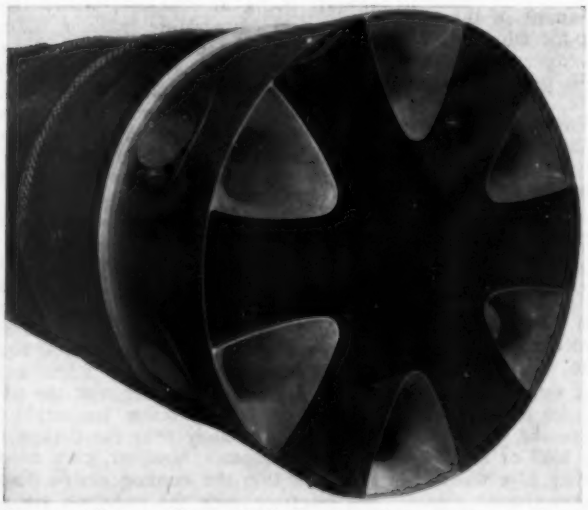
Slab tail of Saro S.R. 53 is powered, has inset trim elevator; rudder has elaborate tab and anti-balance trim-strip device. Top nozzle is for turbojet; bottom for rocket.

Westland Wessex (S-58) with 1,450-hp Napier Gazelle free turbine is shown with latest air intake configuration. (See p. 66.)

Ambulance version of Saro Skeeter has 200 hp D-H Gipsy Major, with Napier rotor-tip rockets for takeoff and vertical climb to 500 ft. It carries pilot, nurse, two stretcher cases.



Rolls-Royce thrust reverser which will be fitted to Avon engines in Comet 4 and Boeing 707 using Conway engines.

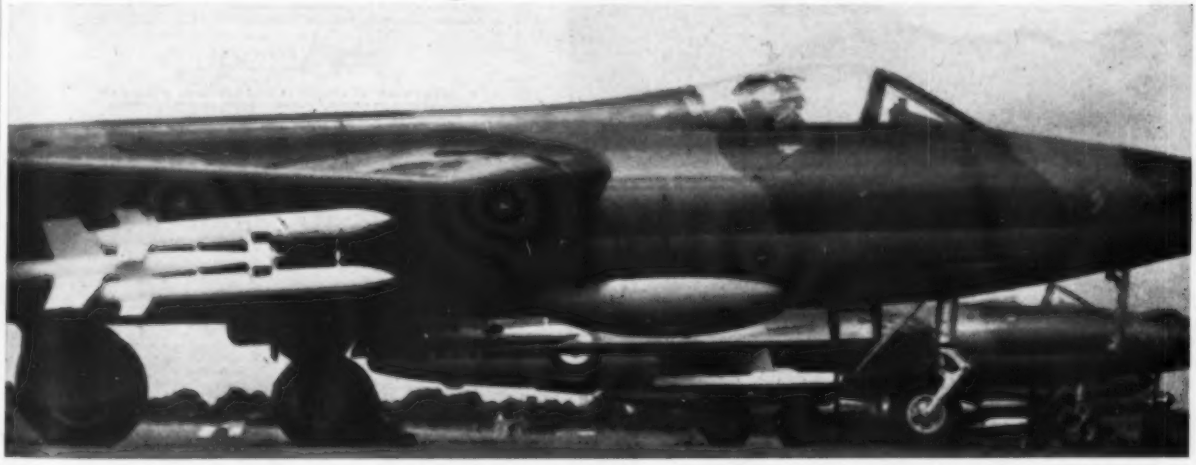


Comet airliners will use Rolls-Royce noise suppressors fitted behind reversers on their R-R Avon engines.

Neat and sturdy fuselage-mounted main gear of Miles M.100 jet trainer uses Dowty liquid-spring shock unit.

Armstrong Whitworth Seaslug SAM for Royal Navy features forward-mounted concentric boosts, four in triple sets for compact shipboard stowage.

English Electric Thunderbird SAM features double-arc supersonic airfoil for wings, plate/wedge airfoil for tail guiding blades, has four concentric boosts.

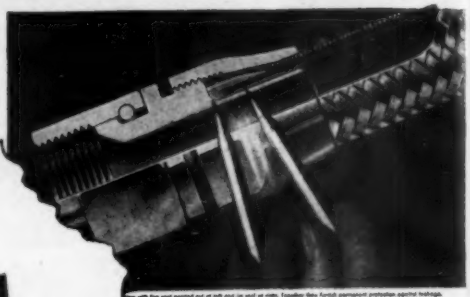


Hawker Hunters mounting two Fairey Fireflash beam-riding AAMs (front) and two D-H Firestreak infrared AAMs (behind). Both missile installations require extended fuselage nose for aircraft aiming equipment.

Wing tip-mounted de Havilland Firestreak infrared AAM on the Saunders-Roe S.R. 53 research interceptor, a tailed delta.

Short's subsonic surface-to-air (and surface) multi-purpose test vehicle was exhibited for first time at Farnborough.

ONLY AEROQUIP 666 HOSE LINES OF TEFLON OFFER ALL THESE ADVANTAGES!



Leakproof Teflon® Hose Line!

...USE OF AEROQUIP "super gem" FITTINGS

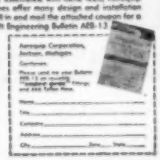
...ing attachment provides the key ...mance of Aeroquip Teflon Hose ...prolonged operation. Aeroquip's unique, ...ented "super gem" Fittings offer double pro... against leakage.

1—a positive metal-to-metal line seal against all pressures.

2—a lip seal formed by the Teflon tube seated, but not compressed, in a special chamber within the fitting.

This means that the hose assembly life under pressure is as long as the life of the Teflon hose itself—a statement that cannot be made of assemblies using compression type fittings because of the cold flow characteristics of Teflon.

Because "super gem" Fittings are reusable and can be readily assembled with hand tools, Aeroquip Teflon Hose Lines offer many design and installation advantages. Fill in and mail the attached coupon for a copy of Aircraft Engineering Bulletin AES-13.



"super gem" is an Aeroquip Trademark. *Teflon trade name for its fluorocarbon resin.

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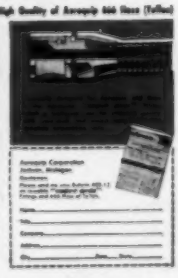
...LEAKPROOF

There's No Mystery to Making Hose of Teflon*

...the Only Secrets Are the Methods Used to Guard the Uniformly High Quality of Aeroquip 666 Hose (Teflon)



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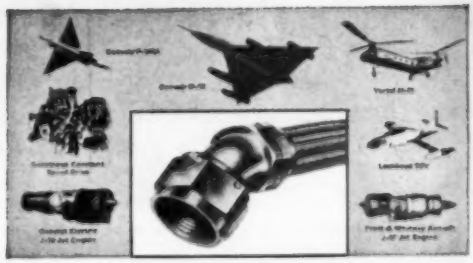
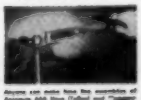
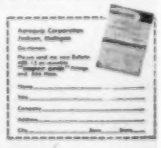


Aeroquip 666 Hose of TEFLON® ...in Use Where Performance Counts





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...FLIGHT PROVED

Aeroquip 666 Hose Lines (Teflon*) Cost Less

BECAUSE *"super gem"* FITTINGS ARE REUSABLE

The true cost of a hose line cannot be determined by its purchase price alone. Hose lines of Teflon with permanent-type, swaged-on fittings are priced competitively with Aeroquip 666 Hose Lines (Teflon), but Aeroquip *"super gem"* Fittings are reusable and can be salvaged. And the fittings are the most expensive part of any hose line!

During production, engineering changes frequently call for alterations of fluid-carrying lines. Because it had purchased hose lines made of Teflon with permanently attached fittings, one aircraft company was forced to scrap more than $100,000 worth of hose lines due to a single engineering change. With Aeroquip 666 Hose Lines made of Teflon the *"super gem"* Fittings could have been salvaged and reused with savings of thousands of dollars.

Not only do *"super gem"* Fittings give Aeroquip 666 Hose Lines cost-cutting advantages, they assure the ONLY leakproof, ageless assembly of fitting and hose of Teflon. Want more information? Mail this coupon.

Aeroquip 666 Hose (Teflon) and *"super gem"* Fitting can be assembled by hand in a few minutes. No expensive swaging machine is necessary. A wrench and a vise do a perfect job.

"super gem" is an Aeroquip Trademark.

Cutaway of *"super gem"* fitting with metal-to-metal hex seal pointed out at left and lip seal at right. Together, these features ensure permanent protection against leakage.

*DuPont trade name for its fluorocarbon resin.

Aeroquip Corporation,
Jackson, Michigan

Gentlemen:

Please send me your Bulletin AER-13 on assembly of *"super gem"* Fittings and 666 Hose.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

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Aeroquip 666 Hose Lines (Teflon*) Simplify Mock-Ups

Because You Can Make The Assemblies You Want Quickly . . . By Hand

Simplify airframe, engine or accessory engineering mock-ups . . . reduce mock-up time. For high-performance fluid lines, use the ONLY hose lines made of Teflon that can be shortened or lengthened quickly and inexpensively . . . Aeroquip 666 Hose (Teflon) with *"super gem"* Fittings.

"super gem" Fittings are designed specifically for use with Aeroquip 666 Hose. They can be removed and re-attached in minutes, by hand, using bench tools. No swaging machine is needed. A small supply of Aeroquip 666 Hose and *"super gem"* Fittings allows you to make hose lines as you need them, or other them when necessary. You never have to wait for shipments of factory-assembled lines.

Another Aeroquip advantage. *"super gem"* Fittings attach to Aeroquip 666 Hose by holding the outer wire braid, using the lip seal on the tube to hold the fluid. This means that the capacity of the fitting to hold the hose exceeds the strength of the hose itself. The *"super gem"* Fitting remains perfectly leakproof for years, as evidenced by its ability to withstand periodic proof tests when inspecting for fitness for further service. Mail coupon for complete technical information.

HOSE LINES OF TEFLON can be made right in your plant. A wrench, a vise and a few minutes' time are all that are needed to assemble Aeroquip 666 Hose and *"super gem"* fittings.

"super gem" is an Aeroquip Trademark.

UNIQUE DESIGN of Aeroquip Lamerized *"super gem"* Fitting inserts three hermetic O-rings and holds the external wire braid firmly. O-rings seal the inner tube without compression thus forming a lip seal. O-rings positive metal-to-metal hex seal.

*Du Pont trademark for its fluorocarbon resin

Aeroquip Corporation,
Jackson, Michigan

Gentlemen:

Please send me your Bulletin AER-13 on assembly of *"super gem"* Fittings and 666 Hose.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

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. . . ECONOMICAL

. . . ADAPTABLE

SO, WHEN YOU SPECIFY HOSE LINES OF

TEFLON*

SPECIFY

Aeroquip

REG. TRADEMARK

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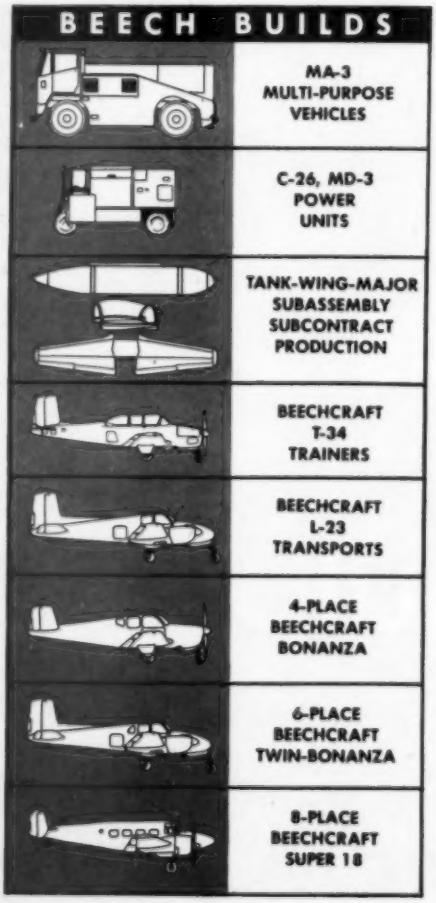

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R3350 gets performance boost from new ignition system

by William O'Donnell

BENDIX SCINTILLA Division is developing a high-frequency ignition system which permits use of a new fuel additive, thereby improving the detonation limits of Wright R3350 Turbo Compound engines.

Bendix research has indicated that the additive, produced by DuPont and the Ethyl Corp., causes no spark plug fouling when the high-frequency system is used. The additive could be used only for about a half-hour without fouling the plugs fired by the present low-tension ignition system.

The high-frequency system was unveiled by Bendix at the 1957 Aircraft Ignition Conference attended by some 100 ignition specialists representing U.S. and foreign airlines, Air Force, Navy, Civil Aeronautics Administration, engine and spark plug manufacturers.

Leaner fuel mixture possible

Scintilla's chief service engineer, H. C. Welch, pointed out that the new fuel additive allows a leaner fuel mixture during engine operation "which means more power with less fuel and that's certainly a magic word which can easily be transferred into dollars saved."

Welch said that Scintilla is making three converter systems which should be at Wright Aeronautical Division for testing during October. Three complete systems are expected to be available for testing in January. There has been considerable testing on engines with singular cylinder and some on multi-cylinder engines where no fouling was experienced with the fuel additive, Welch said.

The system, according to Welch, is purely a high-frequency system and should not be confused with the condenser-discharge system discussed at the conference two years ago. This is a single spark high-frequency system where the condenser-discharge is what is called a trigger spark system—it had a high-frequency spark discharge followed by a heavier current discharge from the condenser.

A diagram of the high-frequency system (right) shows the direct resemblance to the low-tension system.

The high-frequency system has the same electrical circuit as the low-frequency one, having the rotating magnet, low-tension generator coil, breaker, condenser, advance breaker, retard breaker and the relay to actuate the retard breaker. The magneto delivers 250 volts through the distributor to the converter coil, where it is stepped up to 3,500 volts. It spills over into the high-frequency coil, builds to 15,000 volts and fires the plug.

In the high-frequency system, both of the breaker points—that is advance and retard—have been put in the magneto instead of the distributor. The systems through the distributor are the same except for the relocation of the breaker points. It is apparent that the high-frequency converter coil and the high-frequency coil along with the spark plug can be used with the low-tension system.

The two factors that add to electrode erosion yet do not add much to igniting power are considerably lower in the HF system. Spark energy in the low-tension system is .015 joules compared with .003 in the HF system and spark duration is 2,000 microseconds in the low tension compared with 12 in the HF.

Average power in watts in the low-tension hookup is 8 while the HF has 250. Actually, by the lower amount of energy and the much shorter length of time, a higher amount of power is dissipated in a shorter length of time in the HF system. This is considered highly important in ignition, Welch said.

Frequency in cycles per second for the low tension is 4,000 against 1 million for the high frequency. The higher frequency improves the ability to fire a fouled plug and shows up in the tolerable shunt resistance in ohms. The low-tension system will operate down to 250,000 ohms and the HF down to 10,000 ohms.

During the past year aircraft engine ignition problems generally followed the downward trend although the drop in ignition delays was not as sharp as the previous year.

Using statistics of unscheduled distributor removals, Welch pointed out that most of the figures for R2800 engines on Convairs and DC-6s are below the .5 per thousand hours rate. Most figures for R3350-DA distributors were higher, almost 2 per 1,000 hours on the Lockheed 1049 and over .5 on the DC-7.

In case of the R2800 engines on the DC-6, the average figures of 11 airlines reporting showed a rate about twice as high as in 1956. However, Welch pointed out, two airlines had rates so far out of line with other operators that an operational problem of some type is indicated.

By taking an average of the nine other airlines the figure is about .4. Welch said this is the true removal rate and a good improvement over 1956.

Convair exception noted

On the Convairs the removal rate is up slightly when the averages of 10 airlines are considered. However, again one figure is well out of line with the others and this must be considered an operational problem or some inconsistency in the method of reporting removals, Welch said. In this case, the high-rate operator was one of the two experiencing difficulty with the DC-6 engines.

In the case of the R3350-DA engines, the average removal rate was down somewhat on the DC-7 and about the same for the L-1049. Of the seven DC-7 operators reporting, one was considered out of line and the true removal rate was set at about .6. The L-1049 removals were 2.4 per 1,000 hours, slightly higher than in 1956.

Much of the difference in the rate for DC-7s and L-1049s was attributed to the fact that some operators have not gone as far towards the use of an improved carbon brush in the distributor.

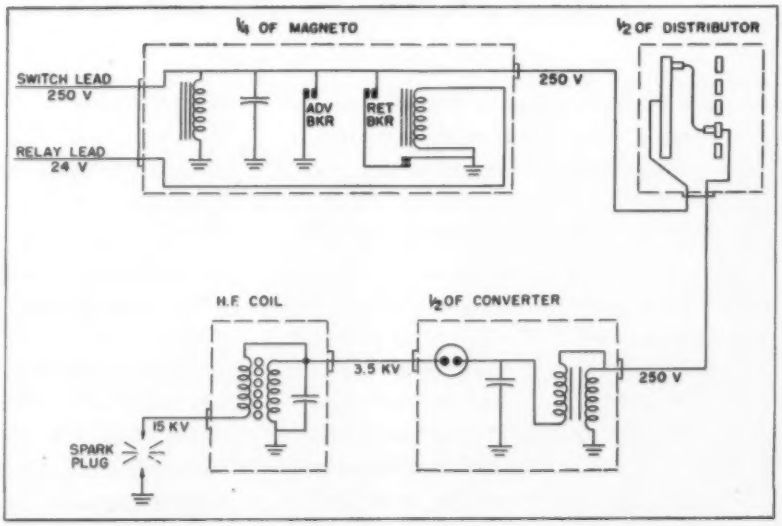
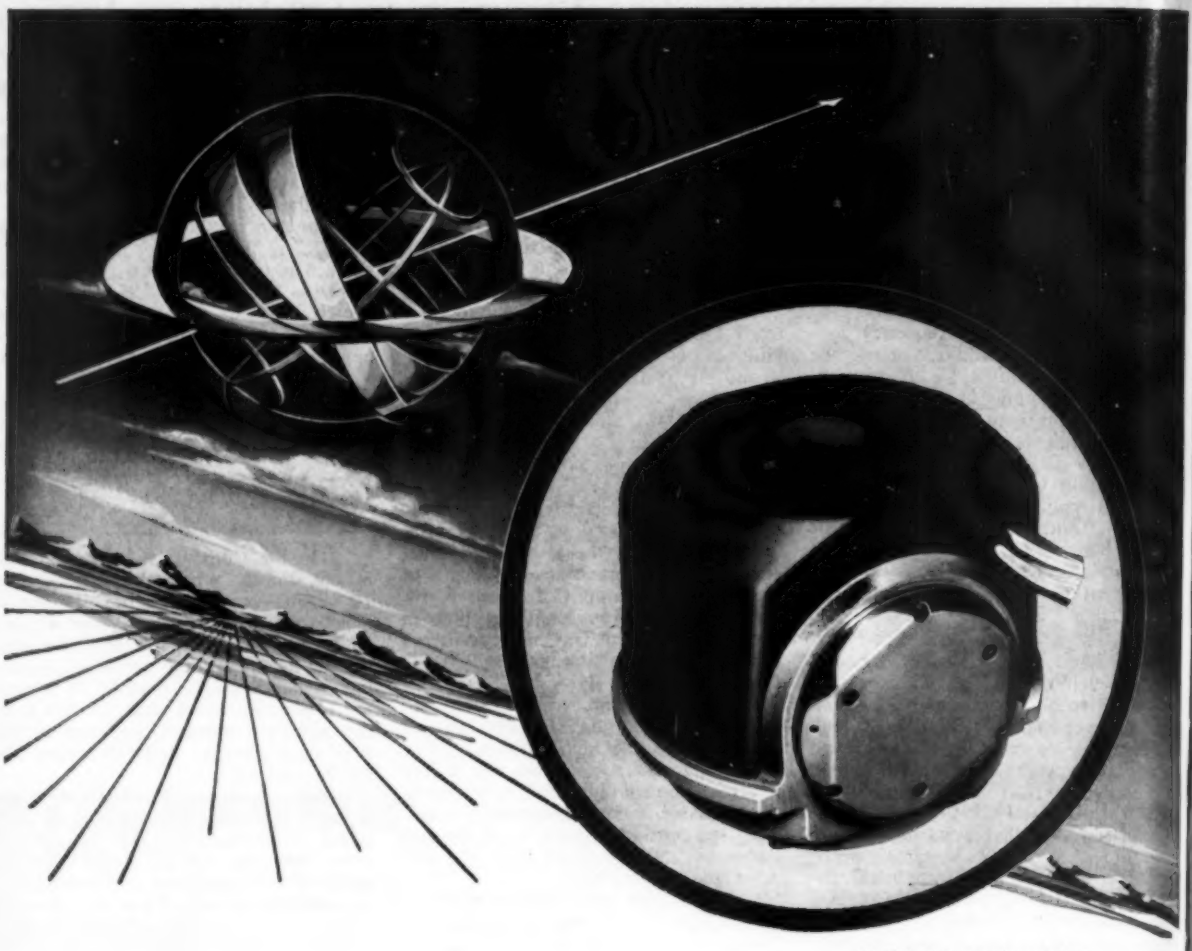


Diagram of high-frequency ignition system.



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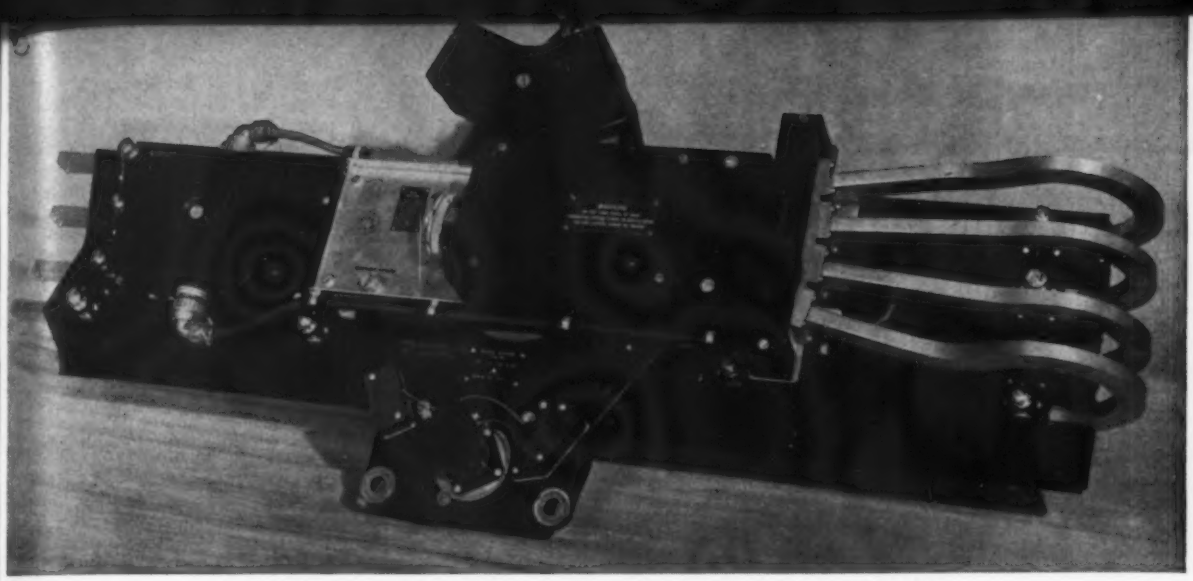


Antenna system of the Marconi military Doppler Navigator type AD2000.

Marconi exhibits 'in-service' Doppler system

ON DISPLAY at the British Farnborough Show was Marconi's Wireless Telegraph Co. Ltd.'s military Doppler navigator which probably holds the distinction of being the first self-contained navigation system in the world to go into service.

The company's AD2000 and AD-2100 systems were shown at the exhibition held in conjunction with the show.

The AD2000 has been in full production for the Royal Air Force during the past three years and differs from the AD2100 in type of information displayed.

Another unit, the AD2300, designed for civil aircraft, was not shown but it was believed that it may also become the first available for civil use (AMERICAN AVIATION, July 1, p. 50).

Designed with an eye to special needs of jet transports, the AD2300 weighs 130 pounds compared with 240 pounds of the AD2000. The civil system presents distance-to-go on a stage of a flight plan, distance-to-go along a composite flight track to a destination, direction and speed of wind, ground speed and drift angle.

Other information available includes left/right indication for steering on a desired rhumb line or great circle track, distance to destination and indication of end of a navigational stage in the flight plan.

Speed range of the AD2300 is 80-900 knots. To take care of increasing airliner speeds and flights over parts of the world where magnetic variation changes in a short distance, the Marconi system includes automatic setting-in of the variation and a display of that information.

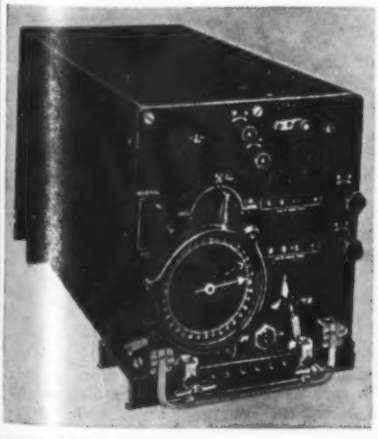
The antenna system radiates two beams, one forward and one backward to measure ground speed.

For drift angle mesaurement one beam is displaced to the right of the aircraft track and the other beam to the left.

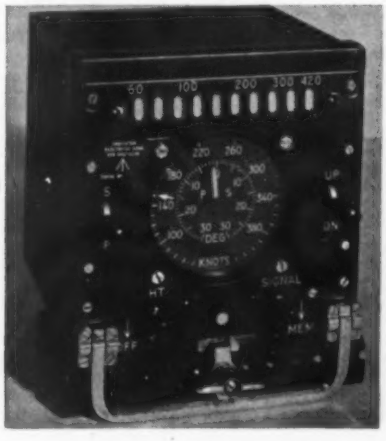
Drift angle is found by comparing Doppler frequency when the forward beam is displaced to the right and the backward beam to the left, to the frequency when these beam positions are reversed.

The antenna is rotated until the two frequencies are equal. It is then aligned with the aircraft track and the angle between that track and the aircraft's longitudinal axis is the drift angle.

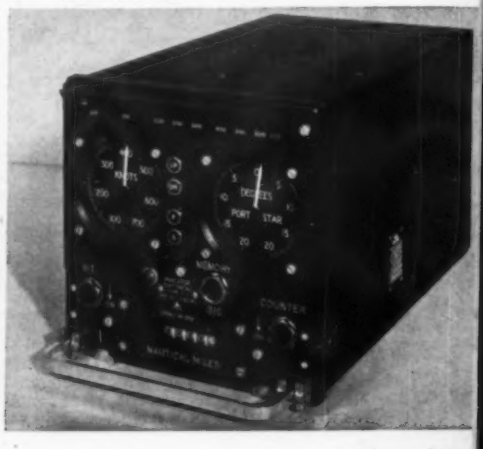
Grid, latitude and longitude, or track information may be shown on this unit for the AD2000.



Ground speed and drift angle are shown on this unit for the AD2100. Same dial shows drift angle and speed.



Ground speed, drift angle and distance flown are shown on this indicator panel for the AD2000.



Boiling water cools Mach 5 electronics equipment

Martin tests indicate drastic cost-weight reduction possible with simple technique of evaporative cooling

by Henry P. Steier

A METHOD as simple as boiling a can of water promises to reduce cost, complexity, weight and space needs of electronic equipment cooling needed for protection against heat developed in highspeed flight.

The method, under test by the Martin Company for a year, is based on water's high latent heat of vaporization which surpasses that of other available liquids. Water has a latent heat of 970 BTU/lb. Nearest to it is ammonia at 590 BTU/lb. Ammonia is reportedly used for cooling in the Bomarc missile.

The Martin system uses a can of water mated mechanically to an electronics chassis. The water is vaporized by external heat and dumped overboard from aircraft or missile as steam. Internal heat generated by the electronics is conducted directly into the water.

Martin said the method is adaptable to any means of electronics design currently in use, any mission profile and any type of propulsion. Study and test work was reported by Robert Berner, Martin thermodynamicist, who directed work on the evaporative method.

Use of water evaporation, Berner said, will give large cost savings per flight vehicle and enable a breakthrough on limitations now being reached with ram air and refrigeration cooling systems.

A typical cost figure for cooling systems development was cited by Martin for the B-58 bomber. Cost was $2 million. The figure does not include unit price of the equipment.

General plan of the Martin design calls for shell-shaped water containers to mate like slip-covers with the surface of tubes and other components projecting from an electronics chassis.

The shells also can be provided with hollow intrusions carrying water to absorb heat from underside of a chassis where other components are mounted.

A finger-contact type material and aluminum wool placed in the tube-cover part of the shell permit heat to pass through those materials from the tube envelopes to the water.

The Martin design provides a filler port and a vent through which steam escapes. During inverted flight or negative gravity conditions, loss of water would be prevented by a check valve. A baffle inside the shell would prevent water loss during violent boiling.

To evaluate cooling over a wide range of Mach number conditions, Martin ran tests on evaporative systems heated in an oven to temperatures from 150°C to 400°C. In one case using a one-tube amplifier, the component temperatures remained constant within 10°C over the entire range. The tube envelope ran between 140°C and 147°C while other circuit components ran between 150°C and 125°C.

In terms of flight mission profiles, the temperatures covered represented conditions from about Mach 2 to about Mach 5.

Martin's study of cooling technology showed its evaporative technique offers the best way around two current trends in electronics cooling. These are compounding-of-complexity and component qualification.

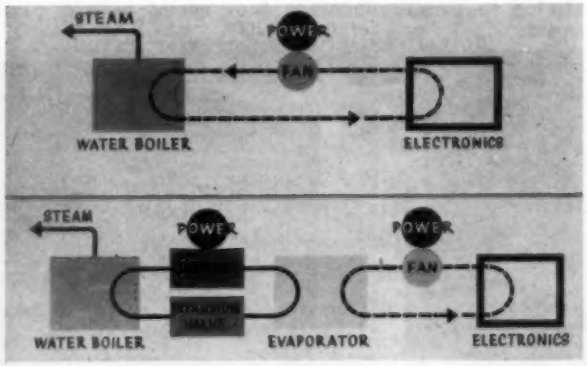
In the case of Martin's Lacrosse missile, it would cost $3 million to qualify a group of non-standard components for a range of 105°C. Few parts can withstand temperatures above 125°C and even these are not fully accepted by system designers.

Martin says we are approaching a plateau in the use of air cycle techniques for cooling electronics equipment, that no further progress is foreseen with such techniques beyond Mach 2.5 speed.

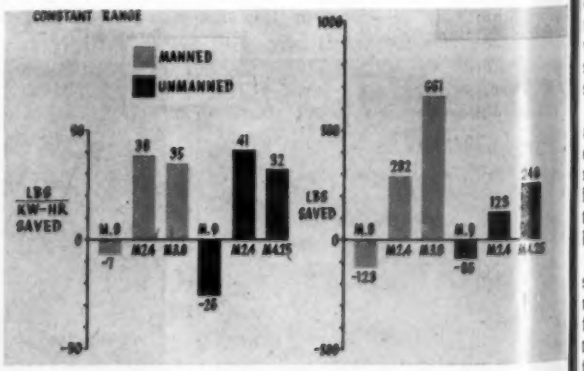
A typical air cycle system draws hot air from the jet engine and passes it through an intercooler where heat is rejected to ram air. The engine air then goes through an air expansion turbine and is routed to electronic equipment.

As speeds increase, so does temperature of ram air. As altitude increases the amount of ram air available decreases. Also, present ratios of inlet to outlet pressures through the turbine limits the pressure drop. This combination of factors limits effectiveness of the simplest air cycle cooling system near Mach 2.

Beyond that speed a water boiler can be added to the air cycle cooling



(Above) Basic elements of complicated air cycling evaporative cooling system for speeds to Mach 2.5 using water for heat transfer but with water remote from electronics gear. (Below) For higher speeds these vapor cycling system elements are needed and further complicate the system.



Weight savings on a kilowatt hour electronics drain and total pounds basis using Martin's evaporative system. Higher savings for manned aircraft result from use of more kilowatt hours for electronics in such vehicles. In lower speed ranges ram cooling is still the most efficient system.

circuit to extend the permissible range to Mach 2.5. Heated air is passed through the water boiler, the heat rejected to water which is dumped overboard as steam.

Another method might be to bypass the intercooler and bring the ram air directly through the water boiler and then through an air expansion turbine. Practicality of this method hinges on use of a complex variable inlet geometry which adds to complexity.

Another approach is cyclic evaporative cooling to obtain refrigeration. This requires a compressor, expansion valve and evaporator.

Other methods being tried include insulate and isolate techniques which separate the electronics from the heated airframe and further remove heat by a heat-sink, such as jet fuel. Amount of heat fuels can reject is small, however.

Martin's findings show that the work, or power, required to obtain cooling with these complex systems mounts rapidly as higher speed ranges are encountered.

The company examined electronic, thermal, propulsion, weight and aerodynamic considerations for both manned and unmanned vehicles over the speed range of Mach 0.9 to Mach 4.5 and designed the most effective conventional cooling for each vehicle and then compared these with the Martin evaporative system.

Total cooling load, drain on the propulsion system resulting from either bleed air or power extraction, and factors like drag resulting from bringing ram air into the aircraft and the additional fuel required were considered.

Martin then designed the most effective conventional cooling system for each vehicle and compared these with the Martin evaporative system. Weight saving for a constant range using the evaporative system was figured both on a total weight saving basis and a weight saving per-kilowatt-hour-electronics-load basis.

Findings showed total weight saving is greater for a manned vehicle than unmanned since these usually carry a larger KW load. Weight saving rose to about 35-40 pounds per kilowatt hour at the higher speeds. In low speed ranges ram air is still the most satisfactory cooling method.

Martin also compared its system against those using the liquid cold plate evaporative method. Such systems use metal conducting paths to exchange heat between components and a metallic heat exchanger carrying cooling liquid.

The company found its system saved about 64 cubic feet of space in manned aircraft and about 1.5-3 cubic feet in missiles over the cold-plate technique. Biggest volume saving came from eliminating storage tanks and pressure feed sources required to force the liquid through the cold-plate system.

Martin predicts big manufacturing and development cost savings with its system. This could be $12,000-13,000 per vehicle in manufacturing. Elimination of rotative machinery used in conventional systems could save $35,000 per unit development cost, and high-speed vehicles might use two or three units.

A packaging survey of 50 different pieces of equipment for range, communications, navigation, countermeasures, etc. showed the Martin evaporative technique results in a 10% weight increase in the packaging of the equipment not including the weight of the water. Volume increase would be minor.

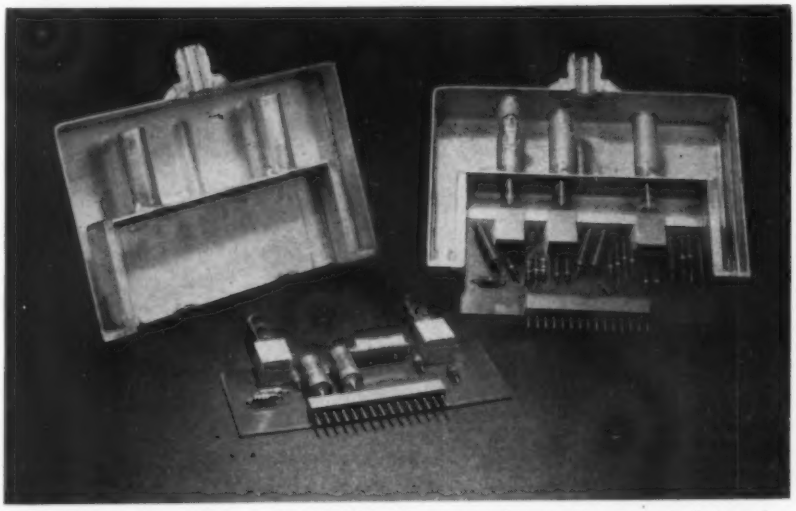
Water weight would depend upon the mission length. In the Martin one-tube test, four ounces of water were enough for 15 minutes cooling at Mach 4.5. At Mach 2.2 that amount of water was enough for 2½ hours cooling.

Another advantage is that water is not carried throughout the mission as a deadweight. Since it goes overboard, it is expended during the mission.

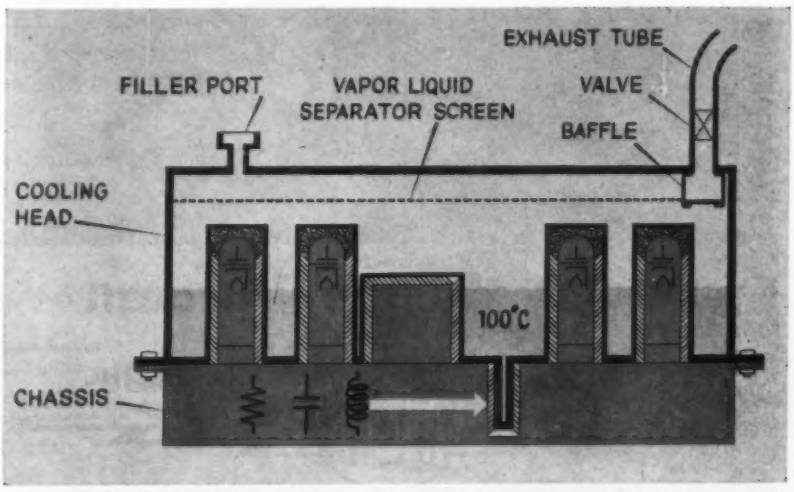
Ability to operate electronics at a fixed temperature level would simplify the circuitry to some extent through elimination of temperature compensating devices. Further simplification in layout could come from freedom to locate components most advantageously for circuit rather than for heat considerations as is being done currently.

Martin's studies indicate its method can be used with any presently used packaging techniques of the modular, conventional layout, printed wiring, stacked wafer, etc. types.

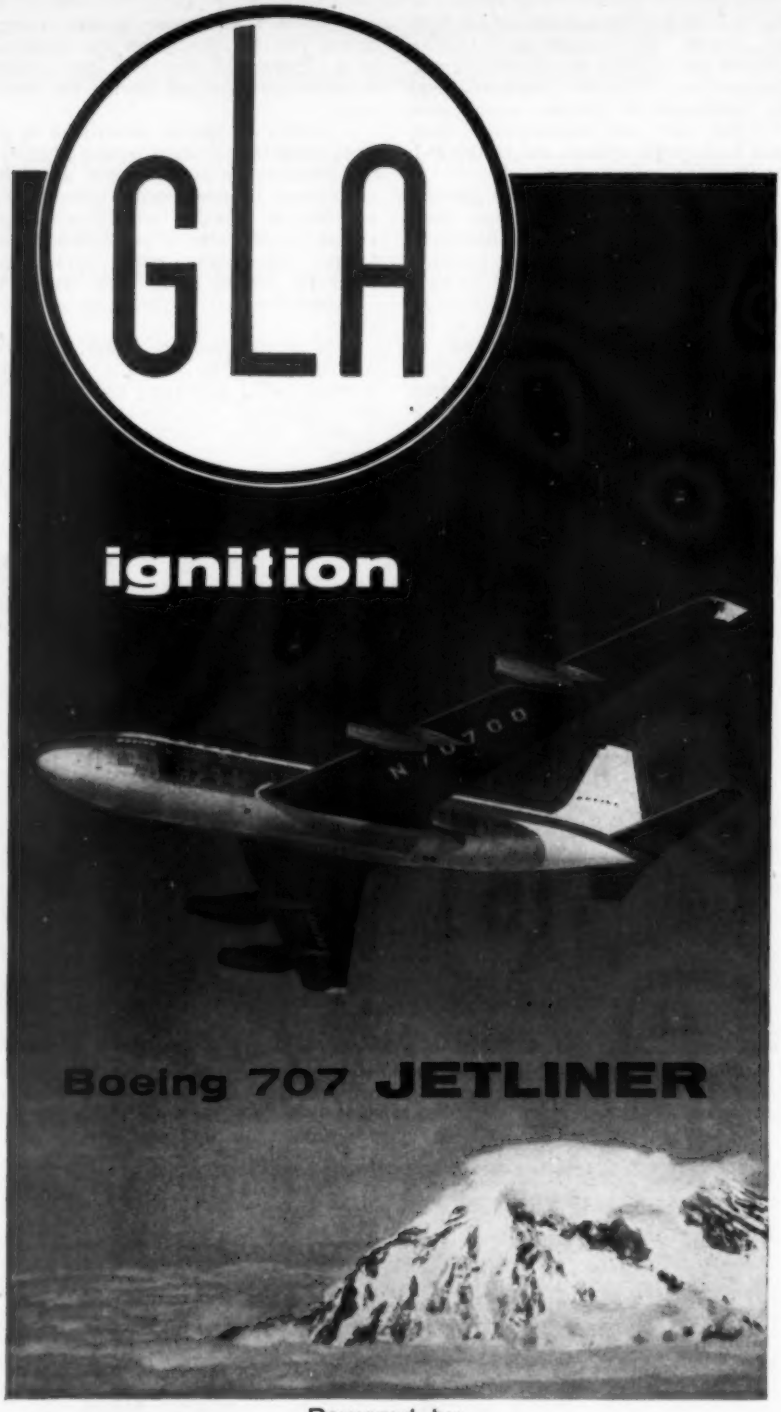
Some systems, such as Raytheon's evaporative-gravity cooling which im-



"Slip-cover" water container for the Martin's evaporative cooling system that maintains electronics components at nearly constant temperature to Mach 5 aerodynamic heating conditions. Covers are made of aluminum sheet stock dip-brazed for fabrication.



Cross-section of basic Martin cooling package. Metallic fingers and aluminum wool in contact with tubes carry heat to water surrounding them. Water container below tube socket level protects under-chassis components.



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merses components in freon, might impose severe electrical losses on high-frequency circuitry surrounded by a liquid. To take care of such losses designers would have to resort to wrap-around cold-plate techniques for parts of the package. Furthermore such systems still need air ducting to carry off transfered heat from the freon vapor to air.

Adoption of the Martin cooling system could result in a major engineering cost advantage by making best use of electronic and thermodynamic engineers' time.

The average electronics engineer has a limited knowledge of cooling engineering and the same applies to a cooling engineers' knowledge of electronics. Since Martin's system is adaptable to any configuration, these two groups could work separately for most effective results in their particular fields.

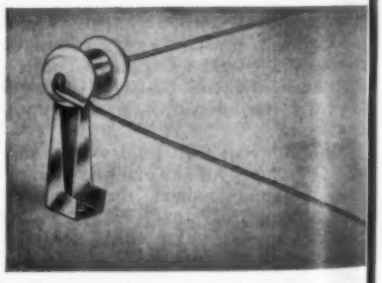
Another advantage could be ability to adapt available electronics to new vehicles without need for major redesign to take care of higher heat conditions.

Berner, however, said he favors cooling of modular electronics by the Martin method. This would simplify construction of the slip-cover water carriers and help reduce the cost of their fabrication.

CAA studies new method of flame detection

Technical Development Center of CAA is evaluating a new method of flame detection which could simplify and reduce cost of fire-detection systems on aircraft.

Developed by the Petcar Research Corp., the flame detector uses standard



1/16-inch diameter aircraft control cable as the sensing element and can distinguish between overheat and actual fire conditions.

Petcar has disclosed that stainless steel wire used for such cables develops a signal of a few volts when it is heated by a flame. Output signal is caused by thermionic emission from the metal and appears as an interrupted DC signal because of pulse nature of flames.

Signal from the detector is fed to an indicating control unit weighing less than a pound. According to Petcar, tests at TDC have exceeded 600 hours and tests on a production model will be run soon.

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New laws should ease airline re-equipment woes

Government-guaranteed loans will help local service lines; Equipment Trust Bill may aid large and small carriers

by William V. Henzey

THE LOCAL SERVICE AIRLINE INDUSTRY, in particular, and small United States certificated airlines in general, have a better financial road ahead thanks to swift congressional action this summer on two bills designed to make the companies better credit risks.

One bill, pushed and sponsored by the Civil Aeronautics Board, provides for government guarantees for loans made to certain classes of short-haul airlines where such loans are for the purchase of new aircraft.

The other, known as the Equipment Trust Bill, permits lenders to gain title to aircraft purchased and to retain title until the loan to the aircraft purchaser is satisfied. Features of this bill may also be employed by large airlines in seeking aircraft financing.

But both appeared to stem from the plight of the local service industry which views new airplanes as a "must" for self-sufficiency but which found it difficult and, in some cases, impossible, to raise money to purchase the planes.

Passage was speedy

Both bills were passed by Congress in the waning days of the recent session and were signed by President Eisenhower early this month. And both must have set some kind of records for speedy passage for they were not introduced in Congress until June.

The guaranteed loan bill dates back, however, to April 1956 when CAB Member Harmar Denny advocated such loans in an appearance before the Senate Interstate & Foreign Commerce Committee. It gained impetus last December when CAB Chairman James R. Durfee advised the industry that CAB favored such a plan.

CAB proceeded to formulate necessary proposed legislation but ran into opposition from the Administration, particularly the Bureau of the Budget, Commerce and Treasury Departments. Not until Memorial Day this year was the agency able to spring its plan loose from the Budget Bureau, although it went to Congress minus Administration backing.

Sen. A. S. "Mike" Monroney introduced the legislation in the Senate and Rep. Oren Harris (D-Ark.) did likewise in the House. Behind the scenes was former CAB Member Joseph P. Adams, counsel for the Association of Local and Territorial Airlines, who registered as a lobbyist for the bill.

The proposal virtually "sailed" through the Senate with a major assist from Sen. Allan Bible (D-Nev.) who filled in for a temporarily-ailing Senator Monroney.

The House was bogged down with more general matters but once Harris turned his activities to airline affairs the issue was never in doubt.

Noteworthy development between Congressional passage and Presidential signature was the withdrawal of objections by Budget and the Treasury Department.

At presstime, CAB advised the industry it would begin "immediate implementation" of the new legislation. It authorizes the Board to guarantee loans up to $5 million per airline, if it finds conditions attached to such loans are satisfactory. In no event can the guarantee exceed 90% of the loan. Provisions of the new Act expire in five years.

The agency is preparing application forms which will be distributed soon. Earliest applicants are expected to be Bonanza Airlines, Mackey Airlines and Wien Alaska Airlines. Initial airplane to be purchased under terms of the new bill is the Fokker F-27 turboprop being produced in this country by Fairchild Engine & Aircraft Co.

Inquiries regarding the new loan procedure should be directed to Sam I. Aldock, Assistant Director of Bureau of Air Operations, Civil Aeronautics Board, Washington 25, D. C.

In addition to Bonanza, Mackey and Wien, all local service lines, territorial carriers operating in Alaska, Hawaii and Puerto Rico, and the three certificated helicopter carriers are eligible for the loan guarantees.

Harding gets credit

Meanwhile, the Equipment Trust Bill appeared to gain its steam last spring during the CAB fight in the Budget Bureau over the guaranteed loan bill.

There were those in Budget, Treasury and Commerce who felt the Equipment Trust Bill more advantageous for the airline industry than the CAB proposal.

One of the guiding lights behind equipment trust legislation was William Barclay Harding, New York financier associated with Smith, Barney & Co. Rep. John J. Flynt (D-Ga.) was first to introduce the legislation and John Floberg, then counsel for the Conference of Local Airlines, was one of its main supporters.

Actually, the Equipment Trust Bill merely involved an amendment to Chapter 10 of the Bankruptcy Act. It provides that the lender's right to take possession of the equipment (purchased with a loan) shall be exempt from the other provisions of the Bankruptcy Act.

The exemption was previously applicable for railroads but not airlines.

It means, for example, that an airline can borrow money from a financial house and give an equipment trust certificate to the lender. Benefit to the lender beyond what he would

No-show penalty plan goes into effect at last

U.S. domestic airlines on Sept. 15 put into effect their no-show penalty plan, aimed at people who make reservations, change their plans, then don't bother to cancel the space and fail to show up for the flight.

Penalty is $3 on regular flights, $1 on helicopters. A passenger is not charged the fee if he cancels his space any time before departure. The ticket does not have to be presented for refund before departure. If there is any question whether the penalty should be assessed, the airline collects the fee and gives the passenger an application to fill out explaining why the money should be returned to him.

When a travel agent handles a reservation and the passenger no-shows, the agent is entitled to $1 of the $3. He also retains one-third of the helicopter penalty.

This is the third phase of the airlines' no-show control plan. Minimum ticket pick-up rules took effect June 1, the reconfirmation rule July 14.

gain from the normal chattel mortgage, is claim to the property before assets are divided up in a bankruptcy proceeding. None of the companies contemplate bankruptcy, of course, but the bill gives added assurance to the lender.

There is one potential gimmick in this bill which will have to be worked out and that is the question of ownership for investment purposes. Since aircraft constitutes the major item of investment for most airlines, they will need to have CAB recognize their "constructive ownership" in planes for which they have issued equipment trust certificates.

CAB was expected to meet with interested parties to iron out this wrinkle and establish a procedure.

Meanwhile, a third financing bill aimed at assisting in the equipment modernization program — the Capital Gains Bill—failed to gain passage at the recent Congressional session and has been made "pending business" for the next session which opens in January. The bill was not defeated; it simply failed to reach the voting stage in the Senate prior to adjournment.

Transpacific case reopens, reviving PAA hopes of paralleling NWA

Like the cat with nine lives, Pan American World Airways' bid to parallel Northwest Airlines across the North Pacific is alive again. Twice in the past three years, the Civil Aeronautics Board voted to deny the PAA application. Only last month, President Eisenhower signed an order of denial.

But as this issue went to press, official status of the case was "reopened."

Specifically, PAA has applied for Great Circle rights across the Pacific between Seattle/Portland and Tokyo. The route is flown now only by Northwest. Prior to August 2, 1957, PAA's U.S.-Japan authorization was confined to a mid-Pacific route between Los Angeles/San Francisco and Tokyo with a mandatory stop en route, usually made at Hawaii.

On August 2, however, CAB and President Eisenhower granted PAA Great Circle rights between California and Tokyo, thus eliminating the mandatory one-stop provision, but denied PAA's request to operate the Great Circle route to Tokyo out of Seattle/-Portland. On that same day, NWA's temporary authority for its Seattle/-Portland-Tokyo route was made permanent.

One month later, however, President Eisenhower directed a letter to CAB Chairman James R. Durfee. "I have decided," the President wrote, "to hold temporarily in abeyance final decision on the question whether Pan American should be granted authority to serve Seattle and Portland on the Great Circle Route between California and Japan.

"In order to carry out this purpose, I desire the Board to prepare and submit to me for my approval an order reopening Docket 5031 to the limited extent of deferring final decision on Pan American's request to serve Seattle and Portland on the Great Circle route."

CAB immediately carried out the directive by issuing an order reopening that phase of the case which previously had gained the title "Re-opened Transpacific Case." Board also afforded parties a "fresh opportunity" to seek reconsideration of the move. There were no indications whether public hearings would be required.

In December 1954, CAB first recommended denial of the PAA application in what was then known as the Transpacific Renewal Case. In February 1955, however, the President decided all other phases of the case but deferred decision on the PAA Great Circle bid. Subsequently, public hearings were held to freshen up the record.

In May 1957, CAB voted unanimously to deny the application and transmitted its recommendation to the White House. The agency estimated award of the competing route to PAA would divert $11 million annually from Northwest and give PAA Pacific Division revenues of about $78 million as compared with about $22 million for NWA.

Commented the Board: "Transfer of over $11 million would seriously affect the economy of daily frequencies by Northwest, and in the long run, lead to dilution of Northwest's competitive strength and the further domination of Pacific travel by PAA. Experience has shown that under such circumstances, the public loses the service benefits which are the realizable public dividend from a sound competitive route structure."

On August 2, President Eisenhower approved the Board recommendation but indicated the "administration's objective" is to provide competitive U.S. service from all gateways "wherever traffic justifies it." He also called on CAB to report to him at least once a year on U.S.-Tokyo traffic developments.

Meanwhile, in another development, Congress passed and the President signed on August 26, the so-called "States-Alaska Permanency Bill." It granted permanency to what had been temporary States-Alaska Airlines, Pacific Northern Airlines, and Northwest. The NWA route was the so-called "inside route" from Minneapolis-St. Paul to Anchorage, Alaska.

When, on September 3, the President directed reopening of the issue, he cited the new permanency legislation as a reason for reconsideration of the earlier decision and noted that "it has come to my attention that recently there may have been substantial increases in traffic between the United States and Tokyo."

The President reasoned that, by virtue of the new permanent status of its "inside" route to Anchorage, NWA might route flights over that route which otherwise would fly through Portland/Seattle to the Orient.

Thus did the Reopened Transpacific Case become the Re-reopened Transpacific Case. Until new reconsideration petitions are filed and ruled upon, there is no way of estimating the future course of PAA's resilient Great Circle bid.

Comet 4 to fly early next year; fuselages being assembled

FIVE COMET 4 FUSELAGES are shown on assembly line at de Havilland's Hatfield, England, plant. Destined for delivery to British Overseas Airways Corp., first of the new Comet series is expected to fly early next year. Deliveries to BOAC are slated to begin by mid-1958.

Tiger 1049Hs setting Pacific airlift records

The six 1049H Lockheed Super Constellations now in operation on Flying Tiger Line's San Francisco-Tokyo route for MATS are reported to be carrying in excess of 40,000 pounds of freight on each flight, with the biggest load so far a handsome 41,997 pounds.

In addition to the all-cargo runs, the airline is flying passengers on many flights in its 99-seat configuration, a commercial record for passenger airlift on the Pacific.

Averaging slightly more than a flight a day to Tokyo, with alternate destinations of Guam, Manila and Okinawa, the transpacific operation involves more than 1.25 million miles of flying each month.

To support this activity, 25 crews are assigned to the lift, with ground personnel stationed at San Francisco, Travis AFB, Honolulu and Tokyo.

An elapsed time of about 30 hours is required for the Tokyo run, and turn-around time at that station averages about 8½ hours, although the aircraft have been made ready for return in four.

Credit for the record freight-load operation is given to the airline's personnel, according to George Vaughn, contract operations manager, who said the airline is well ahead of the minimum on-time schedule requirements of the contract.

"The coordination between our flight crews and ground personnel has been exceptional," he said, "A number of captains have made very valuable suggestions for improvement of the operation."

Brazilian bank approves $54 million for U.S. jets

Expenditure of $54 million for purchase of 11 U.S. jet transports by three Brazilian airlines has been arranged by the exchange control division of the Bank of Brazil.

Meanwhile, another foreign carrier, Cathay Pacific Airways, announced in Hong Kong that it is buying two Lockheed Electra turboprops for delivery in June and August, 1959.

The Bank of Brazil approved $21 million for four Douglas DC-8s for Panair do Brasil, $15.5 million to cover three Boeing 707s for VARIG, and $17.5 million for four Convair 880s for the REAL-Aerovias-Nacional group.

VARIG's order was formally announced earlier this month; the REAL purchase had been revealed last April. However, the bank's action was the first indication that Panair do Brasil was interested in DC-8s. It was learned that a contract for the planes has not yet been signed.

VARIG said deliveries of its intercontinental 707s, costing about $20 million, including spare engines and parts, will start in July, 1960. Powerplants will be either Pratt & Whitney JT-4s or Rolls-Royce Conways. The 110-passenger planes will be used in deluxe nonstop New York-Rio de Janeiro service, cutting flight time to 9½ hours, the company said.

Electra powerpackage installed in YC-131C

ALLISON 501-D13 engine is installed in company-leased Convair YC-131C transport for "Operation Hourglass," 1,000-hr. engine and propeller flight endurance demonstration. Props for the test program are Aeroproducts Turbo-propellers, same as those for the Electra and USAF C-130. Turboprop-powered YC-131 will fly in October.

ELEANOR AFANASIEF USES A ROBINSON . . .

Seen at McClellan Air Force Base, Eleanor is wiring an R-4360 engine — the type used on the B-36, B-50 and C-124 Globemasters. Her wire twister is a Robinson model M80 with the exclusive diagonal jaw design.

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New airliner seats feature improved comfort, style

As many as eight fabrics combined in one Hardman design; production increased from 450 to 800 a month

FOR NEW STYLE AIRLINERS, new-style passenger chairs!

The photos on this page show the seats you'll occupy when you fly in upcoming jets and turboprops produced by U.S. aircraft manufacturers.

"You'll like them," says Stanley Hardman, vice president of Hardman Tool & Engineering Co., whose firm is building seats for the Boeing 707, the Convair 880 and the Lockheed Electra.

Comfort standards are being improved, Hardman reports. Also, the seats will be better-looking.

Stylists are incorporating more color. As many as six and eight different fabrics are being used in some instances. Two tones are being adopted and there are also variations of the two tones.

Designers are paying more attention to the geometry of how a passenger sits, where he puts his feet, how he moves around in the seat. Specifications are more exacting. Seat-belt fastenings and floor attachments are designed for 12G loads as compared to 9Gs for the latest model piston-powered aircraft.

All this costs money. Convair, for example, invested about $37,500 in development costs for the lightweight, combination sheet metal and tubular chair for the present Convair 440. Development costs of Boeing's design for its 707 jet are estimated at around $150,000.

With airplanes getting bigger, the investment in seats per aircraft keeps going up. A set of passenger seats for a DC-6 cost about $16,000. For a current DC-7, it runs from $22,000 to $25,000. For a DC-8, it will be $36,000 to $40,000.

The commercial aircraft seat business is booming as it never has before. Hardman, one of the bigger manufacturers, has advanced from an output of 450 to 800 passenger accommodations a month and is scheduling its rate of production through 1960. This rate may even be accelerated when it adds 70,000 square feet of office and production space which will be ready for occupancy on April 1 next year just in time for the jet program. It is forecasting a 100% increase in engineering in the next year in the development of new seats.

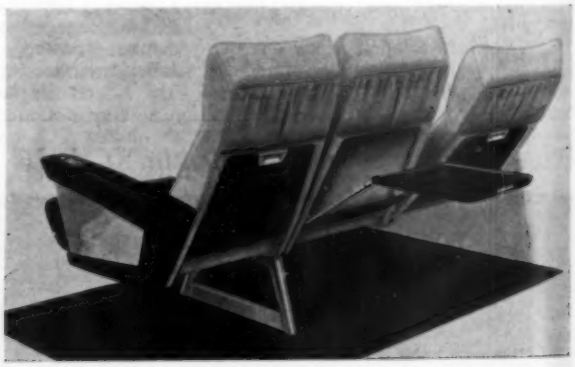
The multiplicity of models complicates the aircraft seat business and compounds the engineering. Hardman currently is producing 60 different passenger models. The number of different chairs already marked out for the Boeing 707 adds up to 13. There'll be more.

Parts provisioning is another growing aspect of the aircraft seat industry. A Hardman chair for a five-abreast seating configuration incorporates 275 parts. A deep reclining (Slumberette-type) lounge chair breaks down into 455 parts.

Hardman's basic commercial line is of aluminum tubular construction designed for lightweight, easy maintenance and, particularly, flexibility. Latter is a critical factor in these days when so many cabin variations are employed.

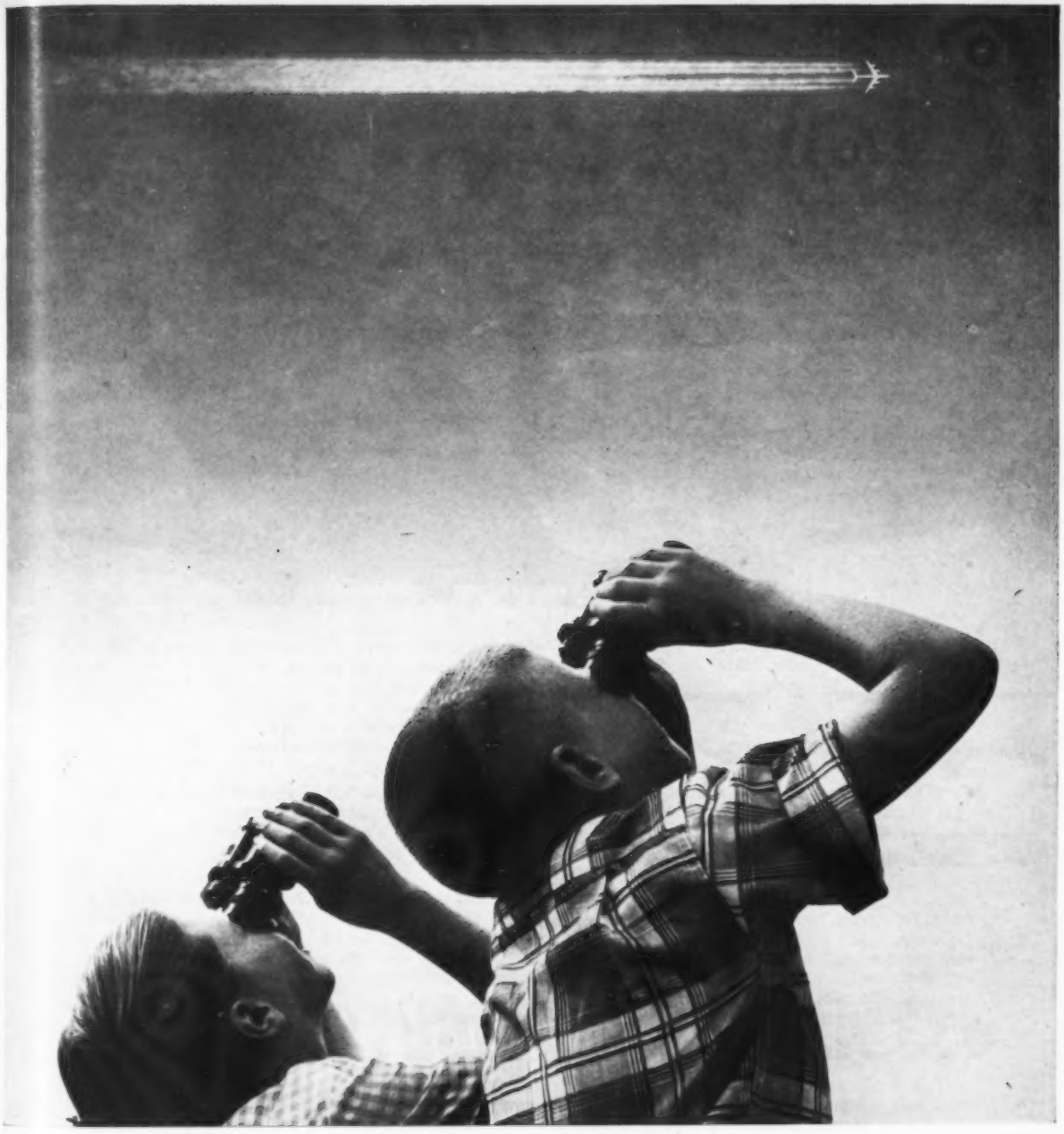
Approximately 82% of Hardman's business is seat manufacturing. Of this, 85% is commercial, 15% military.

Combination of different fabrics is used in chair for Boeing 707. As many as eight fabrics are used in some chairs.



Folding tray in rear features seat for Electra, Convair 880.

Hardman chair for Lockheed Electra and Convair 880 has unusual tray arrangement between seats.



Vapor trails high in the sky will remind you that the 707 is flying its proving runs. Soon these fine planes, the first American jet transports, will come off production. American Airlines will be first to offer jet travel in the U. S. A. Early in 1959 American will use the 707's on transcontinental Mercury service.

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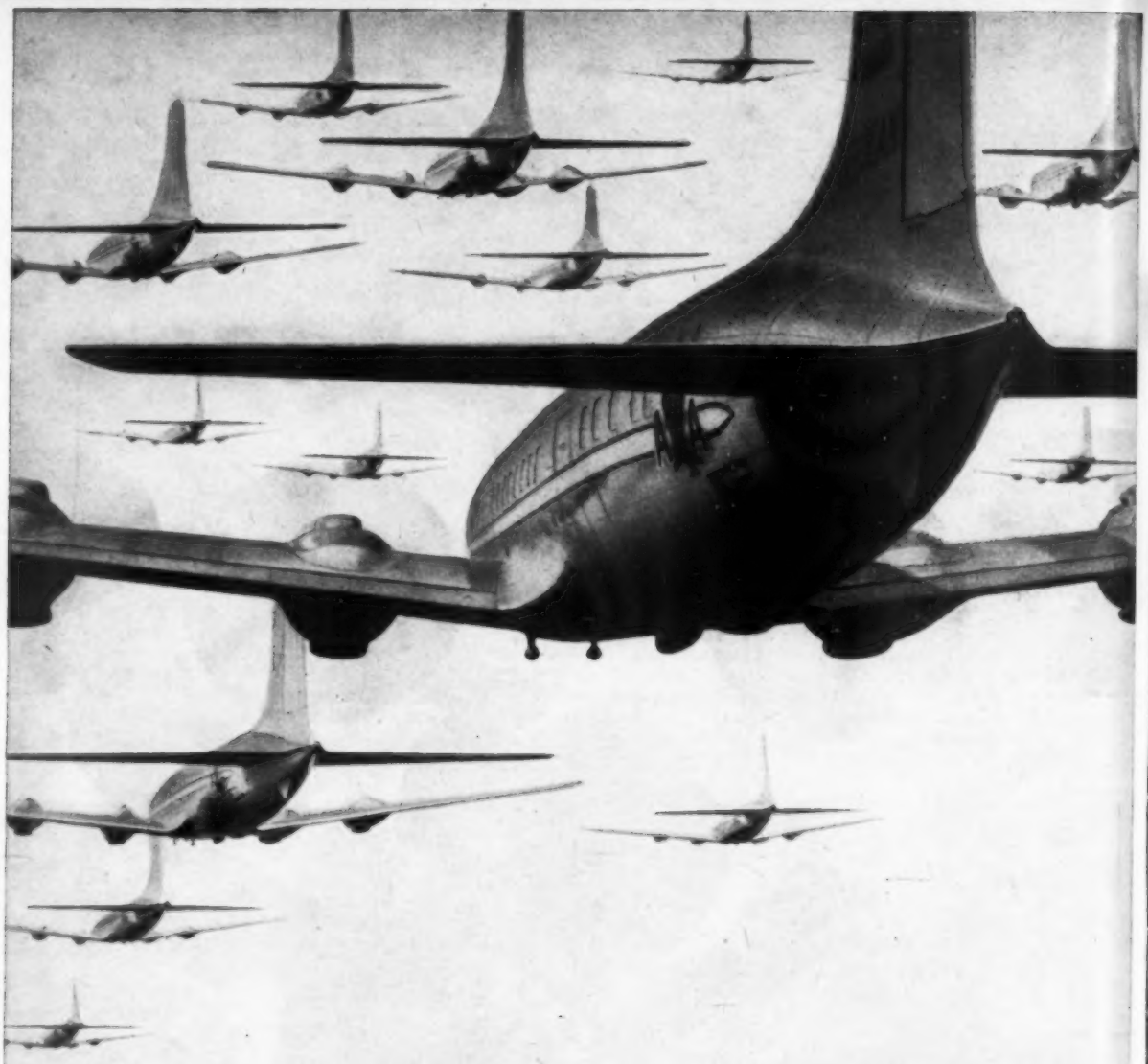

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TRANSPORT TRENDS

Long overdue are (1) White House decision in Service-to-Puerto-Rico Case and (2) CAB examiner's recommendation in Great Lakes-Florida Case. Capital Airlines reportedly is in a front-running position for new U.S.-Puerto Rico routes, with Trans Caribbean making a strong bid to become the first non-scheduled airline to get a long-haul passenger route in the same market. In the absence of an examiner's report Great Lakes-Florida is still wide open.

Airways user charge proposal failed to get to Congress before adjournment. Commerce Department's recommendation, which would have boosted avgas and jet fuel taxes substantially over the next several years, was sent to the Budget Bureau in late spring. It was still there when the Congressional session ended.

Local service airlines are apprehensive over an apparent maximum figure on annual subsidy voiced in Congress last month by Sen. A. S. Mike Monroney (D-Okla.). Locals' subsidy has been rising steadily for past few years, is expected to reach $30 million this year. Monroney, at capital gains hearings, said he thinks that's about the limit Congress will approve. Locals are anxious to lower the subsidy figure but can't foresee it on an industry basis until new equipment is added and integrated into the fleets.

There is far from general agreement in CAB with the recommendation of Celler Committee to dispense with IATA's rate machinery, if necessary, to force fare cuts in the Atlantic. Most top CAB officials favor the IATA set-up. Board's main objective is to get from Congress the same rate powers internationally as it has in the domestic field.

A major fight is developing in the non-certificated airline field. It's resulting from a move by Independent Airlines Assn. to raise its fees for procuring military charter business for so-called Part 45 (charter) operators. The increase, about double present fees, becomes effective Oct. 1 unless blocked by CAB. Leading the fight against the increase is California Eastern Aviation, a Part 45 operator. It has asked CAB to investigate possible antitrust implications of IAA's move. IAA is the organization resulting from merger of Aircoach Transport Assn. and Independent Military Air Transport Assn.

Despite the hint by a Russian official that the recent Tu-104 jet transport flight to the U.S. should be the forerunner of regular service between the two nations, the fact remains that the Russians have never formally asked the U.S. to confer on a civil air agreement. And the U.S. has never asked the Reds for a conference.

No CAB membership expires this year. One year out of every six is an off year under the staggered system of expiration dates in force. Next to come up for renewal will be CAB's senior member, vice chairman Chan Gurney, a Republican. His term expires Dec. 31, 1958.

United Air Lines is believed close to a decision on new equipment for its short and medium-haul routes. Lockheed Electra and Convair 880 are reported running neck and neck. Top officials of Douglas, Boeing, Lockheed and Convair had meetings last week with UAL management.

Total orders received by Fokker and Fairchild for the F-27 turboprop transport have reached 82. Fairchild has 56, Fokker 26. First Amsterdam-built production plane is due to be rolled out in April, 1958, for delivery in October, 1958. Fairchild's is due in January of the same year for March delivery.

Foreign airline executives at IATA meeting blast CAB for refusal to support international fare increases

by Anthony Vandyk

MADRID—Resentment by foreign airlines at the Civil Aeronautics Board's attitude toward international fares reached a new high at the end of the 13th annual general meeting of the International Air Transport Assn. when word arrived from Washington that CAB had virtually torpedoed IATA traffic conference meetings opening September 24 in Miami.

Foreign airline executives felt that the CAB statement favoring continuation of existing fare levels for present services of IATA carriers and strongly supporting the new low-fare high-density service proposed for next spring represented a body blow at the economic stability of international carriers.

At the beginning of the five-day IATA meeting retiring president Lord Douglas of Kirtleside, chairman of British European Airways, criticized CAB's refusal to go along with the proposed 5% increase in transatlantic fares sought earlier this year by a majority of IATA member airlines.

"It was unfortunate," he said, "that this action should have been taken unilaterally by one government. Governments should take full account of the effect of their actions on the economic position of foreign airlines as well as their own."

Delegates also heard a strong criticism of CAB from the IATA Executive Committee. Said the committee: "As a result of a complaint filed with it some time ago by a non-IATA carrier, the CAB issued an order earlier in the year precluding U.S. carrier members of IATA from being bound by IATA resolutions where the U.S. carrier member was involved only in a domestic U.S. segment of the international transportation covered by the resolution in question."

The IATA Executive Committee added that "the CAB action has serious implications." Adoption of the principle inherent in the CAB order by other governments could lead to the complete undermining of the IATA rate structure, the Committee declared, since IATA members can be compelled to carry traffic on domestic sectors at through fares which are arrived at by combination of domestic and IATA international fares and which may undercut fares agreed on in the IATA traffic conferences.

Most of the criticism of CAB was heard outside the conference hall. The only really lively debate in the conference hall centered on an attempt by the European airlines to have the headquarters of IATA moved from Montreal to Geneva.

As a result of considerable lobbying, first vote was insufficiently conclusive—30 for Geneva, 29 for Montreal, and 6 abstentions. A second vote resulted in a unanimous decision by the delegates that IATA should stay in Montreal.

Apart from the anti-CAB feeling and the discussion on the location of IATA headquarters, the big news at the meeting here was not made by the airline industry but the world's manufacturers. Never has there been a IATA general meeting with such numerous high-level representation by the aircraft industries of the U.S., Britain, France, and Holland.

Among the 100-plus manufacturers' representatives were such big names as Lockheed's Robert Gross, Convair's Gen. Joseph T. McNarney, Boeing's William Allen, United Aircraft's William Gwinn, Sud-Aviation's George Hereil and Rolls-Royce's James Pearson. With such representation by manufacturers and the very heavy social agenda there was little wonder the numerous IATA committee reports presented to the general meeting for approval commanded little discussion among airline delegates.

Considerable interest was shown in the decision to make the executive committee more representative of the men who actually are running airlines. This revamping of the committee is aimed to ensure that in the future members "should be people in close and current relationship with a rapidly expanding industry." Furthermore in order to obtain a broader and more frequently changed representation of the IATA membership on its main committee in the future, each member will serve only one term of three years and then yield his seat to someone from another company.

The Executive Committee expressed its concern over the high cost of enforcement. IATA's budget for 1958 amounts to $1,290,000 and of this no less than $215,500 is accounted for by enforcement. Nonetheless, this sum is minor compared with some $29 million which IATA airlines are estimated to be losing from "no show" passengers.

The Traffic Advisory Committee reported particular concern over the "no show" problem. Indications are that the Joint Traffic Conferences meeting in Miami which starts this week will agree to the institution of a penalty similar to that just introduced by ATA member carriers in the U.S.

Main concern of the Miami meeting, however, will be fares from 1958 onward. There was no sign in Madrid that the chief executives of the world airlines have been able to get together on this vital subject so as to guide their sales and traffic experts in their deliberations at Miami.

The only area of unanimity that could be detected at Madrid was dis-

First commercial 707 nears rollout

ENGINES AND TAIL SURFACES are last major components to be installed on first commercial Boeing 707. Aircraft will be rolled out of Renton plant of Boeing this fall and will be delivered to Pan American World Airways in December 1958. Engines are Pratt & Whitney JT3s, commercial version of J57.

tress at present economic trends which are causing either decreased profits or increased losses. The subject of fares for the jet age is complicated by general vagueness as to what will happen to present piston-engine aircraft when the jets arrive.

It was made clear here by spokesmen for several of the smaller airlines —and even some of the bigger ones— that the coming of the jet age is happening too quickly. Both financially and operationally, many carriers are unready for the jets.

It was painfully obvious that manufacturers' representatives here were not just looking for new customers but were trying hard to help those who have ordered jets find ways to pay for them. In a couple of instances the situation seemed so delicate that it was more a case of preventing a cancellation than of securing a new order.

The operational problems of the jet age were extremely well presented in the report of the IATA Technical Committee, chaired by SABENA's A. Vernieuwe. The report issues this stark warning:

"Unless in the field of air traffic services there is a big acceleration of effort, including stepped-up research and increased expenditure of funds, future type aircraft will not only fall short of their potentiality, but will also incur grave economic consequences to the operator in his efforts to provide the public with improved transportation for more people, in greater comfort over longer distances and at higher speeds."

Discussing navigational aids, the Technical Committee reported that the prospects of airlines being able to utilize wholly self-contained aids—especially those based on the principles of Doppler radar—in future aircraft are "distinctly brighter." However, the committee cautioned that "it seems that the high cost of these aids will prohibit their installation in any but the new turbine aircraft initially." It added: "However, there is clearly a large market for a simpler and less expensive form of navigational aid in shorthaul aircraft and helicopters."

A realistic commentary on anti-collision devices by the Technical Committee discusses the proximity warning indicator, the collision avoidance device and the aircraft separation monitor. The collision avoidance device can be regarded as a possible development from the proximity warning indicator which would provide a somewhat broader indication of the presence of a second aircraft which represents a potential collision hazard without any precise indication of the type of evasive maneuver that would best remedy the situation. The collision avoidance system should provide this missing information either by a suitable indication to the pilot or conceivably by initiating the desired maneuver via the autopilot.

For some time, the committee reported, there had been reason to hope that at least the simpler of these two devices could be designed on a non-cooperative or self-contained basis so that any aircraft carrying the equipment would then be protected against all other aircraft irrespective of whether they were installed.

"It now unfortunately appears that such a simple solution is not technically feasible and, therefore, it would be necessary to go to a cooperative system entailing the carriage of some equipment in all aircraft (including military and private), and even more equipment in those which are to receive the cockpit indications," the committee stated. "The aircraft separation monitor is also essentially a cooperative system, but one that might find its application on long over-ocean routes rather than in relatively high-density areas. Such an aid would enable an aircraft to observe the relative positions between itself and other aircraft from which it was being separated by ATC, and continuously monitor that the established separation criteria were being satisfied."

The IATA Technical Committee reported that little notable progress appears to have been made toward early worldwide standardization on a system of secondary ATC surveillance radar to increase the assurance of correct aircraft identification and to improve radar operational coverage under adverse weather conditions.

CAB again opposes IATA fare proposal

Civil Aeronautics Board this month endorsed a proposed new third-class service of the International Air Transport Association as the "basic service to be provided on the North Atlantic after April 1, 1958." Simultaneously, the agency said there appears to be no "economic justification" for an increase in the level of IATA fares.

Views were contained in a statement of position issued by CAB preliminary to the IATA Traffic Conference meetings opening in Miami September 24.

On maintaining existing fare levels, CAB noted its earlier denials this year of a proposed 5% IATA fare increase, and added:

". . . the increases in prices paid by the carriers for supplies, etc., have not been reflected in corresponding increases in the cost incurred in providing the service.

"In the absence of further information relating to the actual operating experience of the carriers which would indicate otherwise, therefore, there appears to be no economic justification for an increase in the level of fares applicable to the various services as now constituted, or for a realignment of services which would result in an increase in the overall average revenue return to the carriers."

On the proposed third-class service, CAB said it "strongly supports" proposed fare levels of $232 one-way with $417.60 roundtrip between New York and London.

Too many electronics shows, survey indicates

Results of a survey conducted by the Electronics Industries Assn. indicate that most manufacturers believe there are too many trade shows each year and that the majority favor only two per year.

The survey was conducted by a special committee of the association named to study the effectiveness and utility of trade shows in the electronics industry. Replies were received from 132 member companies.

For the average manufacturer, costs per show rose to $1,916 in 1956, as compared with $1,712 the year before.

The average manufacturer participated in five shows each year.

Approximately 44% of the companies felt that national electronics shows are becoming too large.

First Army YH-41 goes to Edwards AFB

CESSNA AIRCRAFT CO. has delivered the first YH-41 helicopter to the Army. Copter was taken to Edwards AFB, Calif., where Air Force will conduct engineering evaluation tests for Army. Four-place YH-41 is powered by 260-hp Continental engine.

TWA cuts losses sharply in first seven months of '57

TWA's operating loss in the first seven months of 1957 was $944,000 against a $2,812,000 loss in the same 1956 period, Carter Burgess, president, said in a message to employes.

In the first four months, TWA's loss was $8,078,000, or $2,312,000 worse than 1956, but a $7,134,000 profit for May-July was $4,180,000 better than last year, he said.

Citing operating improvements, he said "we have made our competitors sit up and take notice. We are on our way to a top position in performance, service and economy."

The company "cannot hope to make very much money in 1957 after our poor start, but we can hope for and expect a respectable year in contrast with our very bad showing last year."

Profit improvement "reflects a reduction in unit costs as well as a gain in our competitive sales position. TWA's domestic passenger traffic in July, 1957, showed a 26% improvement over a year ago, compared to a 9% gain for American and a 14% gain for United. . . . In the first seven months of the year we flew 6.5% more revenue miles than last year but recorded a 37% reduction in the number of engine failures, a 49% reduction in . . . cylinder failures, a 24% reduction in the number of times flights returned from flight because of mechanical difficulty . . .

"There are still situations that need correction. We still have too many flights returning from the runway. There is far too much equipment substitution. The Jetstream first-class passenger loads are too low. The departure performance record at Idlewild on both domestic and international flights must be improved."

American drops plans to buy DC-7D freighter

Douglas Aircraft Company's hopes of building a DC-7D turboprop freight plane received a major setback when American Airlines revealed that it has abandoned, at least for the present, its plans to buy the freighter.

AA's reason: airline financing, which has been difficult for some time, has been made even tougher by CAB's refusal to allow the airlines to raise fares 6%.

Said AA president C. R. Smith in a letter to Donald Douglas: "We must review our program to participate with you in the development of the DC-7D . . . The airfreight service needs a new freight plane; one with speed sufficient to permit better delivery time; one with range and carrying capacity sufficient to produce lower ton-mile costs.

"Your figures indicate that the DC-7D can meet these requirements. It has been our intention to purchase a number of these new type planes . . . But that cannot be done now.

"Airline financing has been difficult for some time. It is even more difficult now, for confidence in airline earnings and airline credit has declined substantially since the Civil Aeronautics Board issued the decision which denied even a modest increase in rates . . . And airline credit will not be restored until there can be adequate rates and adequate earnings.

"The decision likewise has had an adverse effect on equity value. Indicative of this is the fact that the market value of the stock of American has declined nearly $16,000,000 since the issuance of the rate decision . . . "

The proposed DC-7D would be powered by Rolls-Royce Tyne engines.

CAB may drop probe into Hughes' Atlas holdings

Attorneys for Howard Hughes and the CAB staff are working against a September 30 deadline in a joint effort to arrive at an agreement which could lead to dismissal of CAB's investigation of Hughes' holdings in the Atlas Corporation.

Deadline was set by CAB Examiner Paul N. Pfeiffer at a brief hearing September 16 at which Hughes was originally scheduled to appear as a witness. Pfeiffer has directed that he wants either the potential agreement or Hughes when the hearings resume in Washington Sept. 30.

Investigation is an outgrowth of CAB's stormy New York-Florida Case. It is aimed at determining whether Hughes acquired control or "power to control" Northeast Airlines through his holdings in Atlas which owns most of NEA's stock. In the 1956 RKO Pictures-Atlas merger, Hughes acquired some $9 million of common stock in Atlas.

His attorneys have insisted in the CAB case that he has no intention of voting the stock but, instead, holds it as an investment. CAB Bureau Counsel Abraham Maller said the Board's staff has taken no position in the case as yet.

But he indicated he would join in a stipulation that would appear to legally bind Hughes from voting the Atlas stock in matters concerning Northeast.

Air Force activates ballistic missile division

The Air Force has activated headquarters of the 1st Ballistic Missile Division at Cooke AFB, Lompoc, Calif. Col William A. Sheppard is commander.

The new unit will make preparations for future operational units and direct their training. First of the training units—704th Strategic Missile Wing—already has been established at Cooke. Overall activity at Cooke will continue to be under Maj. Gen. Bernard Schriever, commander of the Ballistic Missile Division of Air Research and Development Command.

Cooke will not launch missiles during training but will have capability in event of attack.

McElroy tours military facilities, defense plants

Next Secretary of Defense Neil McElroy last week departed on a tour of military facilities and defense plants for inspection and familiarization purposes.

He will take the oath of office shortly after he completes the tour Oct. 5.

Among stops on McElroy's trip: Strategic Air Command headquarters, Continental Air Defense Command, Boeing Airplane Co., Ballistic Missile Division ARDC, Ramo-Wooldridge Corp., Edwards AFB, North American Aviation, Lockheed, Douglas, Convair, Kirtland AFB, Los Alamos, Sandia Corp., Holloman AFB, White Sands Proving Grounds, Fort Bliss, Carswell AFB and Redstone Arsenal.

Hughes may yet get Britannias he wants

While delays in the delivery of Bristol Britannias to BOAC are causing the airline serious financial losses, latest indications are that Britain could arrange delivery of sufficient of the turboprop transports to TWA to meet Howard Hughes' deadline of next spring.

Under a revised program coordinated through the British Government, BOAC would only have to cede five aircraft to TWA. The remainder would be Britannias previously allocated to Hunting-Clan Air Transport, the Royal Air Force and the Ministry of Supply. At press time, however, it was by no means certain that Hughes was prepared to go through with the proposed deal.

Although the problem of Britannia engine icing was not mentioned during a conference 10 days ago in Washington between CAA engineers and the Air Registration Board officials, it is giving tremendous concern to BOAC. The engine icing problem, to quote BOAC's managing director Basil Smallpeice, "overshadows most of our thoughts and hopes at the present time."

"Basically the Britannia is a fine aircraft," he said. "But to date there is no cure to the intake icing difficulties of the powerplant in certain conditions." Smallpeice added the delay in getting a single Britannia 312 into service involves the corporation in a loss at the rate of about $700,000 a year if the aircraft is replacing one of the older types, or about $2,100,000 if the aircraft is to provide extra capacity for carrying additional traffic.

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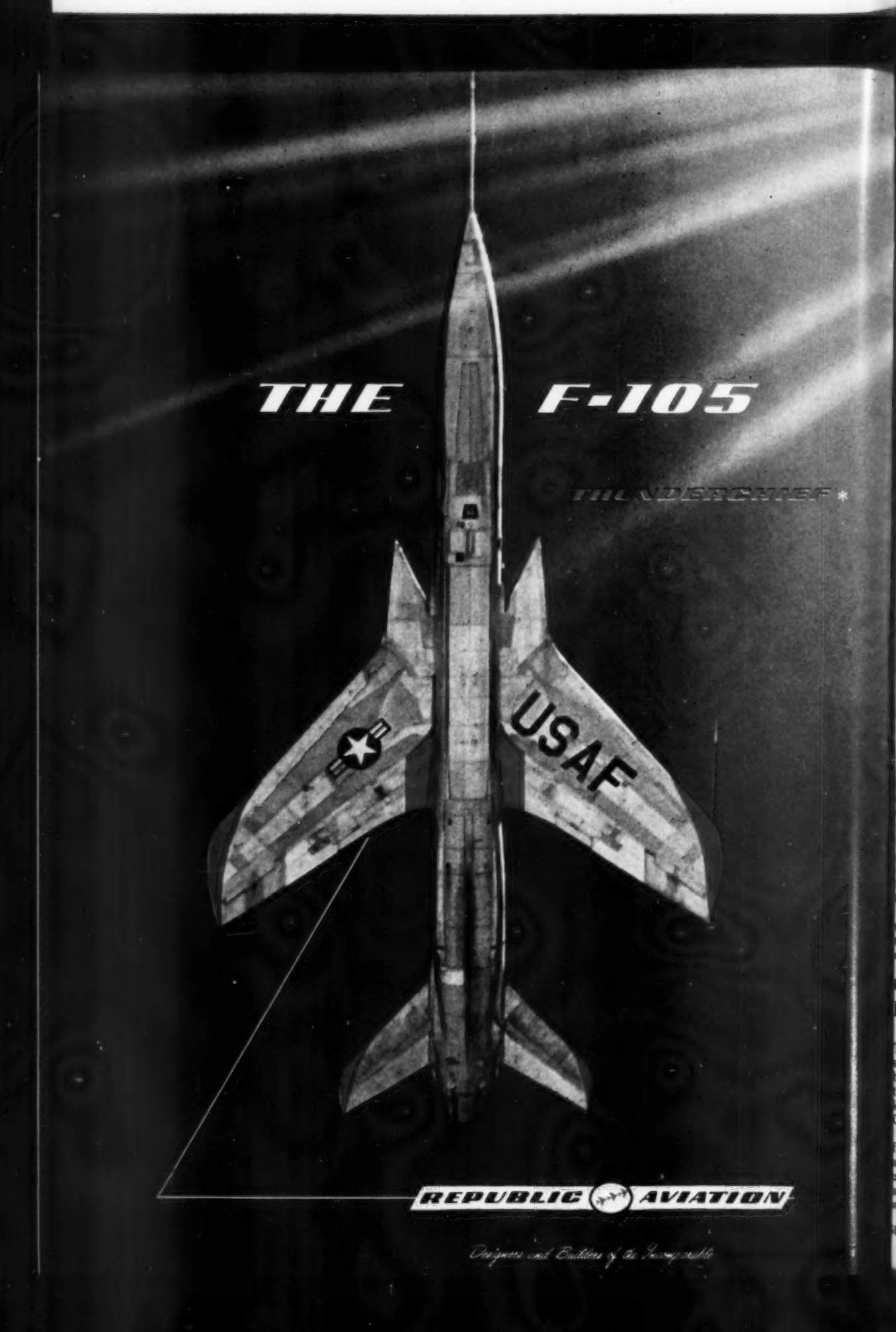
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Designers and Builders of the Incomparable

Armco announces new steel for aircraft, missiles

A new steel said to be the best metal available today for use in aircraft and missiles flying up to 2,700 mph has been revealed by Armco Steel Corp., Middletown, Ohio.

Designated Armco PH 15-7 Mo, the material's chief use is expected to be for airframe skins and major structural parts. Outstanding characteristics attributed to the steel are high strength at supersonic speeds, low cost, assured volume production, ease of fabrication, corrosion resistance.

Armco president R. L. Gray described PH 15-7 Mo as "the most outstanding development in precipitation hardening stainless steels since Armco began pioneering in these revolutionary metals in 1948." He added that the cost of the new steel is less than one-tenth that of high-strength titanium alloys.

An example cited is that planes using PH 15-7 Mo will be able to fly through air-generated temperatures of 1,000°F.

PH in the designation stands for precipitation hardening, and the rest of the number for 15 percent chromium, 7 percent nickel, and a small percentage of molybdenum.

Depending on the condition of the material, the guaranteed room temperature properties for sheet and strip are: ultimate tensile strength, 150,000 max. to 225,000 min. psi; 0.2% yield strength 65,000 max. to 200,000 min. psi; elongation (% in 2 in.) 25 min. to 4 min., the latter figure being given for 0.020 in. thick or thicker material.

PH 17-7 Mo steel is reported to be quite resistant to deformation under both short and long time loading. The stress-strain behavior shown encourages using the material where creep is a factor.

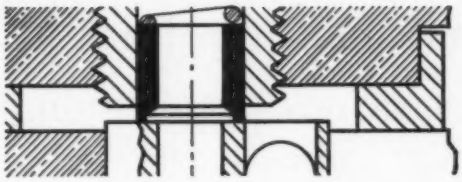
Study of other elevated temperature strength criteria such as compressive yield, shear, bearing and notched-tensile strengths is claimed to find the PH 15-7 Mo steel well suited for the demands of high-speed flight.

The Armco material is amenable to welding, brazing and production in thin precision-rolled sheets for honeycomb bodies, according to Armco.

CAB refuses to suspend FTL Twin Cities service

CAB has turned down a move by The Flying Tiger Line to suspend service at Minneapolis-St. Paul. FTL had described the Twin Cities operation as "marginal" and blamed low load factors and the inadequacy of C-46 equipment for losses.

Board said "on the basis of the facts presented, the carrier has not adequately demonstrated that the situation at Minneapolis is so unfavorable that suspension of service is warranted."



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Continually expanding programs at Northrop Aircraft are creating new opportunities for mechanical engineers in the following areas: launching and landing gear design, hydraulics and pneumatics, control systems, and equipment.

You'll enjoy the fine spirit of cooperation at Northrop. The new multi-million-dollar engineering and science center, now nearing completion, will be a great place to work in, both as to its modern architectural design and newest scientific installations. You'll be associated with a top engineering team on such notable projects as Northrop's new supersonic trainer airplane, Snark SM-62 intercontinental missile, and other advanced aircraft and missile programs.

You'll be given constantly fresh, challenging assignments. Remuneration will be substantial, with many benefits that are unexcelled in the entire industry—health and life insurance, college educational reimbursement plan, regular vacations plus extra year-end vacations with pay, and a generous retirement plan.

At Northrop, the progress of personnel is important. Initiative and ability are recognized and encouraged, and full opportunity is given to present and discuss ideas.

You will find the career opportunity you are seeking at Northrop, pioneer in the design and production of all weather and pilotless aircraft. If you qualify for one of these attractive positions, contact the Manager of Engineering Industrial Relations, Northrop Aircraft, Inc., ORegon 8-9111, Extension 1893, or write to: 1015 East Broadway, Department 4600- N, Hawthorne, California.

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5-A-86

RAF finds pilots can learn to fly jets without previous piston training

HULLAVINGTON, ENGLAND —Jet training from the beginning is not only feasible but in most ways preferable to beginning with piston trainers and later converting to jets, according to Group Captain R. J. Abrahams, commandant of No. 2 Flying Training School of the Royal Air Force.

RAF has been operating eight Jet Provost Mark 1 trainers since September 1956, plus one Mark 2 for the last four months of the courses. In this time flight hours have totaled 4,000 with 11,000 landings. There were only minor accidents during the period, with no injuries to instructors and pupils.

The first 17 pupils finished in September 1956 after completing 1,778 sorties totaling 1,202 flight hours. Five pupils failed in the course—although all soloed—a normal average.

Original program was for 160 hrs. on the Jet Provost plus 70 hrs. advanced flight training on the D.H. Vampire—compared with 120 hrs. on the Piston Provost and 110 hrs. on the Vampire. Half the pupils graduated to the Vampire after only 85-89 hrs. on the Jet Provost. Schedule for the second course is 125 hrs. on the Jet Provost followed by 85 hrs. on the Vampire.

Solo flight scoreboard

Pupils lacking flight experience

Piston Provost	
(average of 4 courses)	14 hours
Jet Provost	
(1st course)	11 hrs. 15 min.
(2nd course)	11 hrs. 45 min.

Pupils with flight experience

Piston Provost	
(average of 4 courses)	8 hrs. 30 min.
Jet Provost	
(1st course)	9 hrs. 50 min.
(2nd course)	6 hrs. 20 min.

Abrahams says that the all-jet training results in easier instruction, quicker learning up to the solo stage because of absence of swing and training in a smoother, quieter airplane.

After solo the pupil has to be watched for altitude, where he can easily fly too high before knowing the snags and the technique. Pupils are restricted to 20,000-ft. solo, but dual is given up to 30,000 ft.

The tower gives each pilot half and three-quarter hour flight time checks after takeoff, while the pupil is required to report fuel state at each stage during his flight plan. The Jet Provost has no aids, only VHF radio (and a standby set), yet it is less dependent upon weather than the earlier airplane, says Abrahams.

Not only is it better to maneuver on the ground in cross-winds—due both to tricycle gear and absence of propeller torque—but it can get clearance through cloud, with top at 8,000 ft. A 3,000 ft. runway is used.

The chief technical officer says that the Armstrong Siddeley Viper turbojet has almost eliminated engine unserviceability. The airframe is designed to give very quick engine change. The Provost Mark 2 has an exceptional serviceability record.

Hunting Percival is at present entering production with the Jet Provost Mark 3 for the RAF. This airplane has provision for ejector seats, a revised clear-view canopy, 60 gallon (U.S.) wingtip tanks, and the uprated Armstrong Siddeley Viper ASV9 turbojet. Provisional data for this version follows:

Dimensions and weights: Span 35 ft. 2 in., length 31 ft. 11 in., height 10 ft. 2 in., gross weight (2 crew, 197 U.S. gals.) 5,910 lb.

Viper ASV9: take-off rating 1,900 lbs., intermediate 1,750 lbs., max. continuous 1,600 lbs., max. rpm 13,800, specific consumption 1.13, dry weight 525 lbs., diameter 24.3 in., length 65.8 in., air mass flow 32 lbs./sec.

Performance summary (at 5,910 lb. initial gross, no tip tanks): Max. level speed, sea level 284 knots (317 mph), 10,000 ft. 295 knots (239 mph), 20,000 ft. 304 knots (350 mph), 30,000 ft. 308 knots (354 mph); initial climb 2,880 ft./min.; time to height (up to 5 mins. for t/o and first-stage climb at 1,900 lb. thrust) 10,000 ft. 4.1 mins., 20,000 ft. 10.3 mins., 25,000 ft. 14.3 mins., 30,000 ft. 19.1 mins.; ground run 1,040 ft., to 50 ft. 1,760 ft., landing roll 1,075 ft., from 50 ft. 2,089 ft.; endurance (allowing 40 gals. (U.S.) for t/o land and reserve) at 20,000 ft. 1 hr. 55 mins., range at 20,000 ft. 270 n.m. (310 s.m.) at 30,000 ft. 300 n.m. (345 s.m.).

With two 60 gallon (U.S.) tiptanks the takeoff gross becomes 6,842 lbs.: endurance at 20,000 ft. 2 hrs. 30 mins., range at 20,000 ft. 435 n.m. (500 s.m.) at 30,000 ft. 475 n.m. (547 s.m.).

Wessex, British copter, has low noise level

First public demonstration of the Napier Gazelle-powered Westland Wessex (Sikorsky S-58 license) at Yeovil, England, impressed observers by the low noise level.

At normal flight powers, the rotor-beat is more audible than the exhaust. Westland's chief test pilot, Slim Sear, says that in the cockpit with headset on it is "impossible to tell that the free-turbine powerplant is running because of the low noise level and complete absence of vibration."

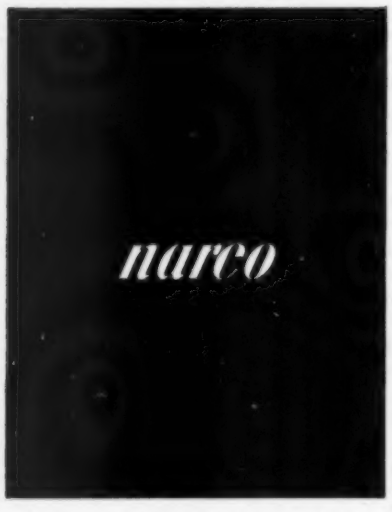
Rotor acceleration from rest to full rpm is achieved in only 20 seconds as the result of smooth power takeup of the free turbine and absence of any rotor clutch engagement.

The helicopter offers significantly improved payload on shorthauls because of the Gazelle's light weight. Commercially, this suggests profitable passenger operation. While present cabin payload is floor-limited to 2,000 lbs., it could be boosted to 4,000 lbs. for short stages.

Latest data for the Wessex, based on Sikorsky and Westland flight tests with the 1,260 shp NGa 13:

Sea level high speed, 125 knots; cruise, 90 knots; maximum rate of climb, 1,600 ft./min.; vertical rate of climb, 600 ft./min.; free air hover ceiling 6,000 ft.; normal range 390 statute miles; empty weight 7,259 lbs.; gross 12,600 lbs.; maximum sling payload 4,000 lbs.

Westland plans first deliveries toward the end of 1958.



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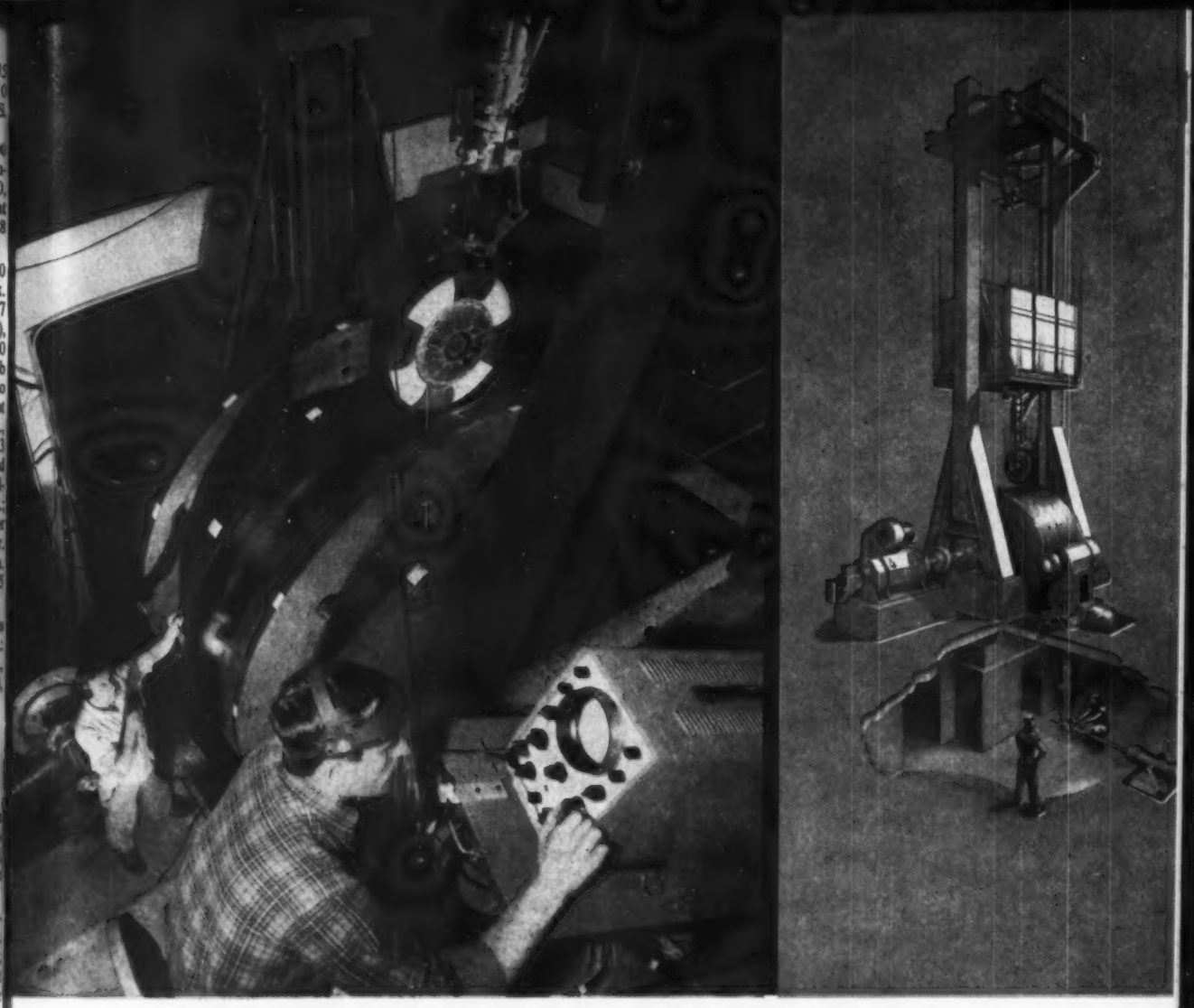

Giant landing gear test facility is 60 feet high. It simulates conditions that heavy, high-speed planes actually meet.

BENDIX SHOOTS LANDINGS INDOORS TO HELP PRODUCE BETTER LANDING GEAR SYSTEMS

When designing and producing complete landing gear systems it is vitally important to know in advance just how every component part will respond to the stresses and strains of flight conditions.

That's why the giant landing gear testing equipment pictured above plays such an important part in the development and production of Bendix* complete landing gear systems.

All major components that make up the system such as control valves, nose wheel steering, retractor actuators, power braking as well as wheels, brakes, shock absorbing struts and even tires are subjected to repeated tests of braking, dropping, twisting and vibration before final approval.

For Bendix has proven over many years that landing gear components that have been designed, engineered and tested to work together give better and more dependable performance than any arbitrary assembly system.

So, when it comes to gear for landing, think and plan in terms of a complete landing gear system. Then, we suggest you think of Bendix and Bendix Products Division at South Bend, Indiana.

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6. Lift more than 44,000 pounds of cargo non-stop 1,750 miles with normal fuel reserve (or lift more than 32,000 pounds over 3,000 miles non-stop).

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One-way censorship

Venezuelan government has resorted to strict censorship in that country on a recent fatal accident involving LAV, the Venezuelan flag carrier. Newspapers were ordered to print nothing about it. Yet a U.S. carrier got treated with banner headlines when one if its planes blew three tires on landing with no injuries to any passengers.

Embarrassing moment

An obliging passenger saved a charter Transocean Air Lines Super Constellation from being stranded at the Ontario (Calif.) International Airport when a gasoline salesman refused to accept the pilot's Esso credit card for $1,135.58 worth of gasoline. Bill Hendrie, manager of the Barstow Chamber of Commerce, signed for the gas purchase with his personal Shell card. TAL has an exclusive contract with Esso, which cross-bills with other oil companies, but the Ontario salesman hadn't heard of such a thing.

Fiscal greetings

To Paul Thayer, vp of sales and service for Chance Vought, goes the award of the year for the most timely and unusual greeting card. It reads "Happy New Fiscal Year" and portrays all manner of tools which, the card says, are "reserved for budgets." Will get many a thoughtful chuckle in aviation and government circles. Moral: Gloomy as the outlook may be, the business hasn't lost its sense of humor.

Helicopters helped

On his recent visit to Los Angeles, Air Force Secretary James H. Douglas managed to stop at four plants in one day by taking advantage of helicopter transportation. Traveled from Douglas to North American, for example, in Northrop's Bell 47.

Boon to sleepers, anyway

Individual reading lights in the Douglas DC-8 will be recessed in the seat at the passenger's left shoulder instead of in the hat-rack overhead. This, Douglas engineers believe, will be a boon to other passengers attempting to sleep.

Air-conditioned hearing

CAB hearing in the Great Lakes Airlines enforcement case adjourned to —of all places—the office of the defense attorney when the room in the Los Angeles federal building became too hot to endure.

From there on the hearing continued in the spacious air-conditioned suite of Defense Attorney Richard Keatinge, where the proceedings were further enlivened when a witness took refuge in the Fifth Amendment. This action severely jolted both sides. The witness was excused but instructed to return with counsel for further hearings.

Doolittle goes supersonic

Jimmy Doolittle, whose feats of accomplishment in the air are legion, experienced his first supersonic flight in a North American F-100F at Palmdale on his last visit to the coast. Air Force Secretary James H. Douglas also went up for a faster-than-sound ride.

BuAer takes the prize

Dubious honor of being the most unimaginative participant in this year's CAB annual airworthiness review no doubt goes to Navy's Bureau of Aeronautics.

In no less than 27 out of 41 suggested rule changes—including one that proposes ceiling and floor emergency exits in transports—Navy had just this stock phrase for its opinion: "This proposal is acceptable to the Bureau of Aeronautics."

Design boner award

To the rocketry designer who had an airplane tail fuselage for representative preflight ground-firing trials and completed all runs with inspection panels off. Result: first flight loosened up the structure and the aircraft was grounded several weeks for panels to be "beefed up."

Know your regulations . . .

When a pilot flying a VFR flight plan runs into IFR conditions and continues to fly in IFR weather, he is not violating the instrument flight rules but is violating the visual flight rules.

• • •

After five years of insisting that airman identification cards were required because of security problems, the CAB has now done a complete about-face and decided that such cards are a burden on the airman and CAA.

• • •

Under present recent flight experience requirements, a pilot operating under the nonsked rules (CAR 42), for night flying, must have made a takeoff and landing at night in the preceding 90 days while, if that same pilot is operating under the domestic or international schedule rules (CAR 40 or 41), he need not meet this requirement.

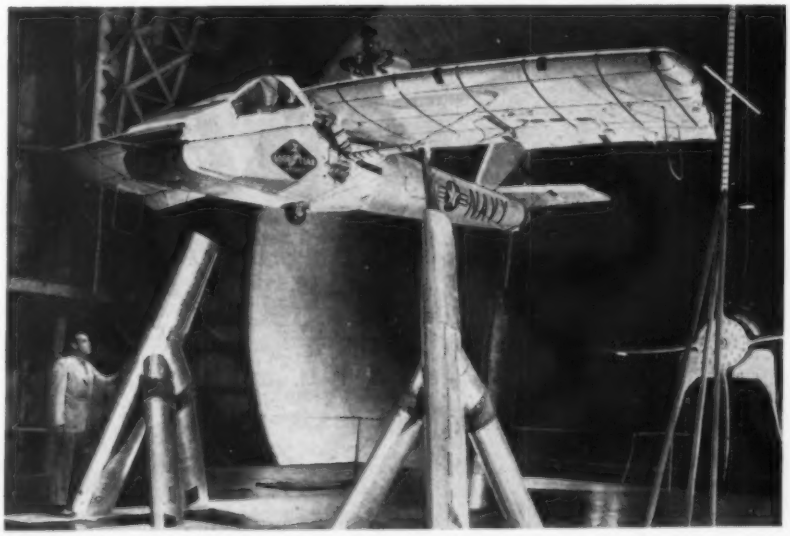
• • •

Commercial aircraft no longer are required to incorporate flashing position lights but in lieu thereof may simply use a flashing anti-collision light.

• • •

The Lockheed 1649A instrument panel does not comply fully with CAR 4b but is certificated under an exemption issued to Lockheed by the CAB.

NACA tests Inflatoplane in full-scale tunnel



GOODYEAR AIRCRAFT'S rubber Inflatoplane underwent a week of testing at National Advisory Committee for Aeronautics' Langley (Va.) Aeronautical Laboratory full-scale wind tunnel. Inflatoplane, at one stage of testing, reportedly had wingtip flip backward into pusher prop under excessive tunnel airloads, deflating the airplane. After "puncture" was patched, tests were resumed.

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A complete, timely report on new products, new materials, new equipment in all phases of the aviation industry. Ten big sections of complete new product and equipment information, including manufacturers' names and addresses. Plus important editorial features.

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Busy engineers throughout the many-sided aviation field will keep this one issue at hand all year, use it as a standard reference index whenever they're looking for new products, equipment, materials to meet new specifications, adapt to new uses. The aviation industry is dynamic and changing, always on the lookout for new products and materials to solve tomorrow's problems. The "Engineers Handbook" issue will deliver heavy reader traffic for the next 12 months.

Circulation for this issue—60,000 . . . to be directed to engineers and management in all critical industry functions.

HIGH IMPACT EDITORIAL FEATURES

Editorial features will tie in closely with the engineering theme . . . case studies of manufacturers procurement policies, service techniques. These full-scale analyses of ever-present industry problems will guarantee high reader interest.

TEN BIG DIRECTORIES IN ONE

Directory listings will be separated for reader convenience into ten sections—each arranged by product type with alphabetical listing of components for quick reference.

Advertisements will be placed as close to the specific product listing as make-up will allow. When an engineer looks for your type of product, he's sure to see your ad.

Whatever your product, there's a special section here for you.

1. AIRCRAFT ACCESSORIES . . . fuel, oil, hydraulic, pneumatic, fire extinguishing and detection, oxygen, pressurization, etc.
2. ENGINE ACCESSORIES . . . fuel, oil, water injection, starters, magnetos, fuel control, injection systems.
3. INSTRUMENTS . . . all aircraft and engine instruments and related accessories.
4. ELECTRONIC EQUIPMENT . . . all airborne transmitters, receivers, power supplies, antenna equipment, cockpit instrumentation and controls, all devices related to communication, navigation and radar equipment.
5. ELECTRICAL/ELECTRO-MECHANICAL . . . generators, voltage regulators, power supplies, circuit breakers, all electro-mechanical devices.
6. AIRCRAFT FURNISHINGS . . . seats, foot rests, ash trays, galley and food service supplies, signs and placards, etc.
7. GROUND SUPPORT EQUIPMENT . . . starters, ground power supplies, oil and fuel servicing equipment, tractors, service carts, etc.
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10. HARDWARE . . . bearings, nuts, bolts, fasteners, tubing and wiring clamps, control cables and turnbuckles, gaskets, seals, etc.

Wherever illustrations or photos are necessary to present the product editorially, they will be included. Many new products appearing here for the first time will be given feature presentation. All this adds up to high reader interest, effective advertising opportunity. Don't miss it. Reserve enough space to tell your full product story, give all the details the buyer will need before your salesman calls.

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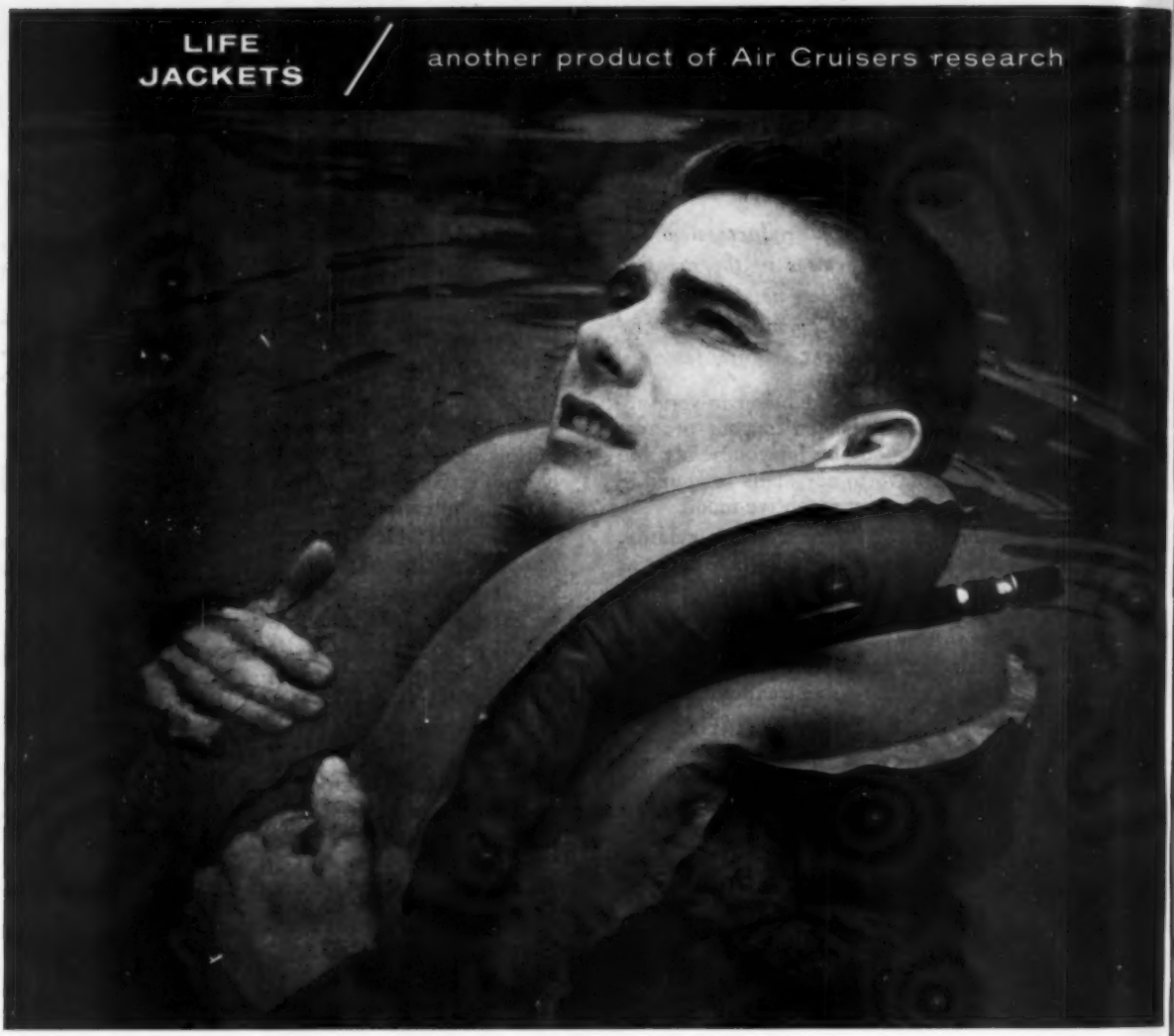

Would you bet YOUR life on it?

Every Air Cruisers engineer has been asked this question 1,001 times. Simply because the lives of others often do depend on his work.

Take the life jacket pictured here as an example. It keeps the disaster victim—even an unconscious victim—in proper breathing position.

This "heads up" life jacket is a result of Air Cruisers' continuous research in survival problems. It was made available to the aviation industry and the military only when the answer to that familiar question became "yes."

In recent years, almost every significant development in lightweight survival products has come from Air Cruisers.

Now we are applying the careful design and production policies which achieved leadership in the rubberized fabric field to the manufacture of lightweight industrial plastics and radiation shielding.

And we're making them as though our lives depended on it.

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AIR CRUISERS DIVISION

BELMAR, NEW JERSEY

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WEST COAST TALK

by Fred S. Hunter

Commercial designations of J57 and J75 engines not catching on; CAB accident findings awaited anxiously

TALK TO ANYBODY in the business about the engines for the Boeing 707 or Douglas DC-8 and almost invariably they'll refer to them in military terms, using the designations J57 and J75. Looks as though it will take a spell for the proper commercial designations, JT3 and JT4, to catch on. To spell out JT3 in full, add the model number C6, since this later version is now the engine scheduled to be used in both 707s and DC-8s using JT3 power. The C6 carries a new P&W guarantee to maintain its full takeoff rating up to a 92-degree day. With power loss due to temperature so much more critical with jets than with piston engines, this feature is important to airlines. Thrust rating of the C6 is about 11,200 pounds. Water augmentation will increase this approximately 15% or to a total of about 12,800 pounds.

The time should be approaching for the CAB to hand down its report covering its investigation of the mid-air collision between a Douglas DC-7B and a Northrop F-89J while both were being flight-tested in the area over Pacoima, Calif. last winter. A good deal of importance attaches to the CAB findings because of legal implications. So far, about 20 suits, totaling approximately $5 million, have been filed in behalf of ground victims hit by fragments of the Douglas plane. Mostly, these suits charge both companies with negligence. Some include the government. One even names Continental Air Lines because the DC-7B, which a Douglas crew was flight-checking, was scheduled for delivery to this carrier.

Lockheed's proposed turboprop version of the Model 1049H Super Constellation, using Allison Electra engines, would have a payload capacity of 46,000 pounds, or 4,000 pounds more than a cargo version of the Electra itself. Takeoff weight of present 1049Hs converted by kits would be 148,000 pounds. This proposed turboprop Connie is not to be confused with the test vehicle Lockheed is flying in a 1,000-hour service test program on the Allison engines. This airplane is a Model 1449 Super Constellation, designed originally for P&W T34 engines. The Allisons in this airplane, incidentally, are commercial 501-D13s, identical to those that will power the Electra and not military T56s.

Noticeable feature of Northrop Aircraft's new engineering building at Hawthorne—low-level drafting tables at which engineers and draftsmen can sit in comfort with their feet on the floor, instead of perching on high stools. Before making the investment in the new equipment, Northrop made some tests, first at Radioplane, then at Northrop, to ascertain the kind of furniture its engineers preferred.

Hardman Tool & Engineering is developing an air-cycle galley cooler for Pan American, which wants to avoid use of dry ice in its upcoming jets. . . . From Col. Robert V. Kirkland, chief of the Los Angeles Procurement District, comes the report of practically zero overtime in the aircraft industry in this area. . . . No matter which aircraft manufacturer wins the Navy's low-level bomber competition, Pratt & Whitney will be the victor with its J52 engine.

What's your favorite airline? Guy H. Evans, who represents several foreign carriers in the U.S., speaks a word for Air-India International. He likes Air-India's roomy seats. All the first-class seats in Air-India's 1049 series Super Constellations are Hardman deep-reclining chairs (Slumberettes) installed at maximum spacing, 68 inches in the forward cabin, 66 inches aft. Add top-flight cabin service, which Air-India has, and you have the most enjoyable travel conditions possible, Evans relates.

If you want to know why everybody at Boeing is glowing with pride these days, it's because Air Force Secretary James H. Douglas, stopping off in Seattle on his way back from Alaska, flew in the KC-135 jet tanker/transport and, when he got to Los Angeles, right in the shadow of the Douglas company, told a press conference: "It undoubtedly is one of the finest airplanes ever built."

No doubt about it, these new jet transports are going to be very high-toned indeed. Arm-rests of the Qantas' Boeing 707s are to be covered with genuine Wallaby hides. . . . Mockup of On Mark Engineering's turboprop executive is almost completed. . . . Any time an arresting gear fails to function and a Douglas A3D twin-jet goes over the side of a carrier, that's two million bucks in the drink.

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Circle No. 119 on Reader Service Card.

Half of U.S. civil aircraft based at fourth of airports

More than half of the civil aircraft in the United States are based at fewer than one-fourth of the airports, according to a survey of civil airports and based civil aircraft compiled from Civil Aeronautics Administration statistics.

Of the nation's 69,707 civil aircraft, 40,325 are based at 1,768 publicly owned public-use airports. Of the remainder, 20,017 are based at 1,201 privately owned public-use fields; 3,649 are at publicly owned limited-use airports and 5,727 at privately owned limited-use bases.

The CAA figures show that 24% of the nation's airports are publicly owned and available for public use; 16% are privately owned for public use; 13% are publicly owned for limited use, and 47% are privately owned for limited use.

Publicly owned airports are those owned or controlled by city, county, state and federal governments or similar political subdivision. Public-use airports are those attended every day and having at least fuel for sale, plus all airports that serve air carriers, CAA intermediate fields, airports having beacons indicating a lighted airport or airports at which federal funds have been expended under the federal aid airport program of Development of Landing Areas.

The survey also found:

16% of the airports are privately owned, public-use fields and base 29% of the aircraft.

13% are publicly owned, limited-use airports and base 5% of the aircraft.

47% are privately owned, limited-use airports and base 8% of aircraft.

Average number of aircraft based at the different type airports are 23 at publicly owned, public-use; 17 at privately owned, public-use; 4 at publicly owned, limited-use; and 2 at privately owned, limited-use. Overall average is 16 at publicly owned airports and 6 at privately owned airports.

Following is a breakdown by state:

	AIRPORTS									BASED AIRCRAFT								
	PUBLIC USE AIRPORTS			LIMITED USE AIRPORTS			TOTAL AIRPORTS			AT PUBLIC USE AIRPORTS			AT LIMITED USE AIRPORTS			TOTAL		
	Publicly owned	Privately owned	TOTAL	Publicly owned	Privately owned	TOTAL	Publicly owned	Privately owned	TOTAL	Publicly owned	Privately owned	TOTAL	Publicly owned	Privately owned	TOTAL	Publicly owned	Privately owned	TOTAL
ALABAMA	23	7	30	22	23	45	45	30	75	334	52	386	41	71	112	375	123	498
ARIZONA	24	20	44	10	87	97	34	107	141	650	226	876	175	50	225	825	276	1101
ARKANSAS	27	13	40	9	32	41	36	45	81	488	108	596	17	63	80	505	171	676
CALIFORNIA	157	95	252	77	201	278	234	296	530	6697	2680	9377	1600	573	2173	8297	3253	11,550
COLORADO	25	18	43	31	43	74	56	71	127	642	260	902	58	69	127	700	329	1029
CONNECTICUT	8	10	18	0	37	37	8	47	55	238	137	375	0	65	65	238	202	440
DELAWARE	2	6	8	1	12	13	3	18	21	30	107	137	1	56	57	31	163	194
FLORIDA	73	19	92	27	23	50	100	42	142	1861	188	2049	29	53	82	1890	241	2131
GEORGIA	35	10	45	28	38	66	63	48	111	732	120	852	60	63	123	792	183	975
IDAHO	49	8	57	49	54	103	98	62	160	544	158	702	30	38	68	573	188	761
ILLINOIS	49	78	127	1	203	204	50	281	331	1278	2128	3404	13	264	277	1289	2392	3681
INDIANA	31	59	90	6	100	106	37	159	196	835	1078	1913	21	155	176	856	1233	2089
IOWA	46	34	80	15	96	111	61	130	191	843	267	1110	72	280	352	915	547	1462
KANSAS	75	24	99	35	104	139	110	128	238	1093	241	1334	75	184	259	1168	425	1593
KENTUCKY	19	7	26	4	16	20	23	23	46	405	59	464	18	34	52	423	93	516
LOUISIANA	27	11	38	15	125	140	42	136	178	743	125	868	37	201	238	780	326	1106
MAINE	15	10	25	13	64	77	28	74	102	139	75	214	19	23	42	158	98	256
MARYLAND	11	15	26	1	20	21	12	35	47	248	331	579	11	99	110	259	430	689
MASS.	23	29	52	0	16	16	23	45	68	529	514	1043	0	53	53	529	567	1096
MICHIGAN	70	44	114	58	54	112	128	98	226	1764	849	2613	135	108	243	1899	957	2856
MINNESOTA	56	23	79	41	292	333	97	315	412	1157	124	1281	128	17	145	1285	141	1426
MISSISSIPPI	23	10	33	12	32	44	35	42	77	500	132	632	24	94	118	524	226	750
MISSOURI	36	24	60	13	41	54	49	65	114	680	548	1228	13	80	93	693	628	1321
MONTANA	45	9	54	58	58	116	103	67	170	596	10	606	95	14	109	691	24	715
NEBRASKA	51	17	68	28	152	180	79	169	248	683	166	849	55	215	270	738	381	1119
NEVADA	20	6	26	31	23	54	51	29	80	235	103	338	5	9	14	240	112	352
N. HAMPSHIRE	10	3	13	3	14	17	13	17	30	102	31	133	23	35	58	125	66	191
N. JERSEY	11	41	52	2	53	55	13	94	107	606	696	1302	4	142	146	610	836	1446
N. MEXICO	27	10	37	20	42	62	47	52	99	510	74	584	54	36	90	564	110	674
NEW YORK	41	70	111	8	145	153	49	215	264	1377	1232	2609	10	332	342	1387	1564	2951
NO. CAROLINA	30	25	55	6	52	58	36	87	123	637	329	966	8	163	171	645	492	1137
NO. DAKOTA	22	15	37	46	92	138	68	107	175	330	72	402	123	116	239	453	188	641
OHIO	40	81	121	7	139	146	47	220	267	1602	1245	2847	34	545	579	1636	1790	3426
OKLAHOMA	41	20	61	34	49	83	75	69	144	967	367	1334	94	85	179	1061	452	1513
OREGON	29	16	45	25	75	100	54	91	145	776	408	1184	35	146	181	811	554	1365
PENNA	44	97	141	5	93	98	49	190	239	1010	1442	2452	11	126	137	1021	1568	2589
R. ISLAND	3	3	6	1	3	4	4	6	10	95	71	166	0	20	20	95	91	186
S. CAROLINA	25	7	32	9	24	33	34	31	65	350	52	402	17	39	56	367	91	458
S. DAKOTA	50	16	66	5	5	10	55	21	76	513	144	657	6	4	10	519	148	667
TENNESSEE	31	2	33	12	8	20	43	10	53	648	4	652	41	13	54	689	17	706
TEXAS	141	85	226	40	395	435	181	480	661	3685	1584	5269	220	565	785	3905	2149	6054
UTAH	33	6	39	14	5	19	47	11	58	331	63	394	23	3	26	354	66	420
VERMONT	7	3	10	4	7	11	11	10	21	61	25	86	9	15	24	70	40	110
VIRGINIA	23	20	43	8	40	48	31	60	91	369	405	774	21	86	107	390	491	881
WASHINGTON	50	27	77	39	66	105	89	93	182	1056	535	1591	92	152	244	1148	687	1835
W. VIRGINIA	25	2	27	2	14	16	27	16	43	349	20	369	18	42	60	367	62	429
WISCONSIN	41	40	81	22	59	81	63	99	162	673	415	1088	65	112	177	738	527	1265
WYOMING	24	6	30	13	94	107	37	100	137	336	17	353	9	19	28	345	36	381
TOTALS	1768	1201	2969	910	3420	4330	2678	4641	7319	40,325	20,017	60,342	3649	5727	9376	43,973	25,734	69,707

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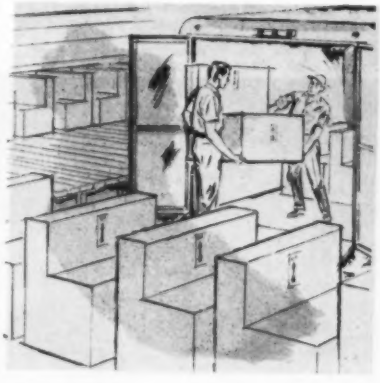

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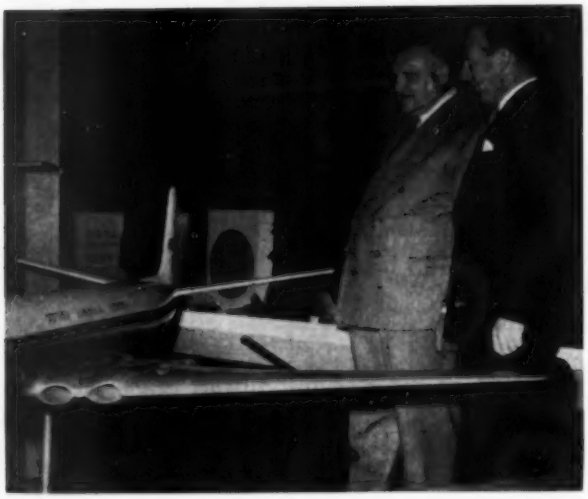
PEOPLE

Ralph L. Gray (left), president of Armco Steel Corp., and Ted F. Olt, director of research, discuss Armco's newest stainless steel, PH 15-7 Mo (see page 65). New steel resists air friction heat developed at 2,700 mph, is easily fabricated, low cost and available in volume. ⟶



Lord Douglas of Kirtleside (left), chairman of British European Airways, and A. F. Burke, managing director of de Havilland Aircraft Co., look over model of Comet 4B. BEA has six of the Continental Comets on order, expects to place them in service early in 1960. ⟵

ALLEN

MANSFIELD

CLEVELAND

Candid photos taken by Wayne W. Parrish, AMERICAN AVIATION editor and publisher, with Minox, during recent visit to Boeing Airplane Co., Seattle. From left: William M. Allen, president, Harold Mansfield, director of public relations, and Carl Cleveland, manager of public relations and advertising.

PARKER

MONTGOMERY

Jack S. Parker is new vp-public and employe relations for General Electric, moving up from gen. mgr. of Aircraft Gas Turbine Div. John B. Montgomery, former gen. mgr. of Production Engine Dept., succeeds Parker.

HALL

WENDAHL

LARSON

ESCH

HILBURN

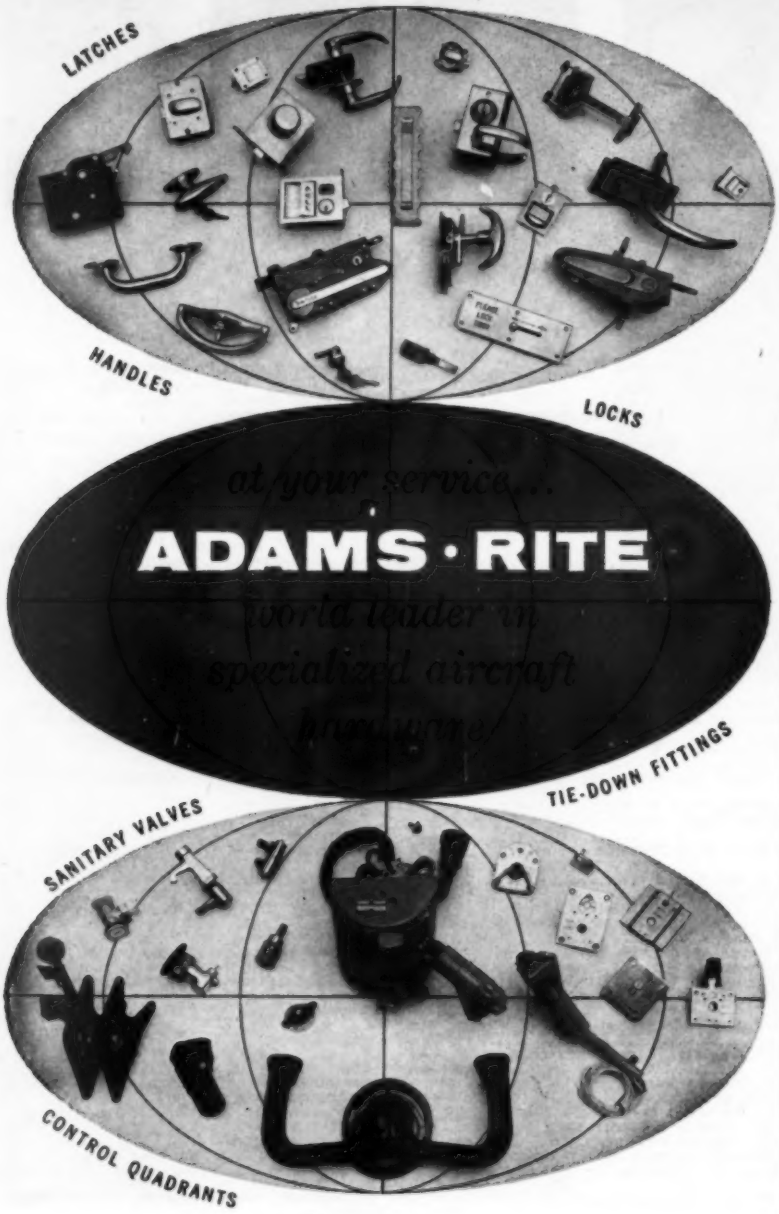
PELSTER

Manufacturing

Name	New Position	Former Position
Robert A. Hall	VP and dir., PacAero Engrg. Corp.	Chief missile mfg., Northrop Aircraft
Roy E. Wendahl	VP-sales, Hughes Aircraft Co.	VP and mgr. of Tucson operations
Paul A. Larson	VP and gen. mgr., Hertz Rent A Plane System	VP and asst. gen. mgr.
R. E. Esch	VP, Vickers Incorporated	Gen. mgr., International Div.
Earl D. Hilburn	VP-development, Link Aviation, Inc.	VP-West Coast Div.
Arthur F. Pelster	VP-aircraft products sales, American Machine & Foundry Co.'s Leland Electric Co. Div.	Aircraft products sales mgr.
Norman L. Winter	Mgr., Countermeasures, Sperry Gyroscope Co.	Gen. sales mgr.
Robert F. Stoessel	Hercules commercial sales mgr., Lockheed Aircraft Corp.	
Richard A. Brown	Mgr. service engrg., Minneapolis-Honeywell Regulator Co., St. Petersburg, Fla.	Mgr. sales engrg.
E. D. Cowlin	VP-sales, Quality Fasteners, Inc.	Chief of projects, Aeronautical Div., Minneapolis
Martin Boe	Air-to-surface missile engrg. mgr., North American Aviation, Inc.	Gen. mgr., Reliance Div., Eaton Mfg. Co.
Leonard I. Kent	Chief microwave engr., Narda Microwave Corp.	Project engr., Missile Development Div.
Joseph M. Johnston	VP-mfg., The Victoreen Instrument Co.	Sr. project engr., F-R Machine Works
C. Graydon Lloyd	Gen. mgr., General Electric Specialty Electronic Components Dept.	Operations supt.
W. D. Rennie	Secy., De Havilland Aircraft Co., Ltd.	Mgr. engrg, Technical Products Dept., Syracuse
Dr. Charles H. Lutz	Chief of advanced design, Hamilton Standard Electronics dept.	With de Havilland Enterprise
Earl Kirmser	Dir. pub. rel., Rheem Mfg. Co.	Arma Div., American Bosch Arma Corp.
Clifford A. Busse	Engrg. mgr., Electronics Div., Rheem Mfg. Co.	In chg. pub. rel., Campbell-Mithun Adv. Agency
Lester C. Becher	Eastern sales mgr., Aircraft and Ordnance, The Weatherhead Co.	Asst. mgr. and chief engr., missile test equipment, Farnsworth Electronics Co.
Robert L. Johnston	Asst. to pres., Advance Industries, Inc.	
B. J. McNamara	Mgr. sales and service, Pratt & Whitney Aircraft Div.	Mktg. engr., General Electric Co.
Leonard H. Seeman	Mgr. products sales engrg. dept., Greer Hydraulics, Inc.	Deputy dir. R&D, USAF Headquarters, Washington, D.C.
Merle E. Snyder	Mgr. Electronics Div., Atlas Precision Products Co.	Exec. asst. to gen. mgr.
Fred C. Neuls	VP, Hertz Rent A Car System	Asst. production mgr.
Elmer R. Easton	Gen. mgr., Wyle Associates	Mgr. electronic equipment div., Hunter-Bristol Corp.
Richard H. Perley	VP and gen. mgr., Hycon Aerial Surveys, Inc.	Pres., Abbey Rentals, Inc.
Herbert H. Halperin	Weapons system support project engr., Aerophysics Development Corp.	Sales mgr., PacAero Engrg. Corp.
H. N. Beveridge	Mgr., Electronics Dept., Aerophysics Development Corp.	Head, Customer Services Div.
Howard S. Gleason	Asst. gen. mgr., Electronics Div. of Stromberg-Carlson	With Sperry Gyroscope Co.
Charles E. Ellis	Mgr. defense products div., General Tire & Rubber Co.	Mgr., Santa Barbara div., Raytheon Mfg. Co.
Cliff N. Williamson	Chief engr., Central Engrg. Div., Airpax Products Co.	Mgr. of marketing.
John B. Graef	Mgr. aviation industry sales, Westinghouse Electric Corp.	Tech. rep. for defense products in Dallas.
James Ray Gilmer	Mgr. customer relations div., Varo Manufacturing Co., Inc.	Supv. devel. Magmeter frequency detectors, Baltimore plant
Vernon L. Haag	VP, missile test equipment, Farnsworth Electronics Co.	Mgr. engine sales
William C. Norris	Pres., Control Data Corp.	Asst. mgr.
John P. Hicks	Asst. to gen. mgr., Fairchild Guided Missiles Div.	VP-operations, Gray Mfg. Corp.
William E. Bracey	Eastern sales mgr., Camloc Fastener Corp.	VP, Remington Rand Univac
James G. English	Western sales mgr., Camloc Fastener Corp.	Acct. exec., Tex McCrary, Inc.
Kelley H. Hantz	Mgr. ind. rel., Lockheed Aircraft Service-International	Asst. sales mgr.
Don F. Maier	Organizes Don Maier & Associates	Asst. western sales mgr.
Geoffrey Parsons, Jr.	VP for Europe, Northrop International	Supv. labor relations, Ontario, Calif.
Gerald J. McCaul	VP-contracts and service div., Simmonds Aerocessories, Inc.	Mgr. aircraft sales, Pacific Coast Div., L.O.F. Glass Fibers Co.
Myron G. Domaits	VP-research and development div., Simmonds Aerocessories, Inc.	Dir. information, North Atlantic Treaty Organization.
Maj. Gen. C. Rodney Smith	VP, International Standard Electric Corp.	Gen. contracts mgr.
Eduardo Garcia	Exec. dir., Puerto Rico Ports Authority	Chief engr.
J. William Robinson	Pres., Leeds & Northrup, Canada, Ltd.	Deputy chief of engineers, U. S. Army.
John H. Baker	Mgr. mktging., General Electric Co.'s Jet Engine Dept.	Controller, Economic Development Admin.
Harold V. Scollin, Jr.	VP and secy., Electronic Products Corp.	Coordinator-western operations, Leeds & Northrup
F. Daniel Applegate	Project engr. of F-102A and TF-102A, Convair Div. of General Dynamics Corp.	With Ventures Limited, New York City
		Asst. gen. mgr.
		Engrg. dept., Convair-San Diego

Airline

Betty Flood	Group Travel Coordinator, Continental Air Lines	Fashion coordinator, Emery Byrd Thayer, Kansas City
Capt. Steven G. Hawes	Dir. flight operations-Atlantic, Trans World Airlines	Asst. dir.
Capt. Lyle R. Hincks	Dir. flight operations-East, Trans World Airlines	Dist. mgr. flight operations, Chicago.
Samuel B. Conlon	Dir. inspection and maintenance, Airline Training, Inc.	
James T. Scholtz	Asst. vp, Pan-American-Gran Airways, Inc.	Asst. chief of inspection, National Airlines, Miami
James K. Butler	Regional mgr., Pan American-Grace Airways, Inc.	Regional mgr. in South America
John J. Heavey	Field training supt., United Air Lines	Supt. of stations, Lima, Peru
D. F. Johnson	Interline sales supt., British Overseas Airways Corp.	Sr. instructor, Chicago training dist.
Mel Licking	Mgr. interline and agency sales, Riddle Airlines	Dist. sales mgr., Jamaica
		Dist. sales mgr., Cleveland



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BOOKS

They Fought for the Sky. *By Quentin Reynolds. Rinehart & Co. Inc., N. Y. 304 pp. Price, $3.95.*

Here is a new book about the airplanes and pilots of World War I.

Reynolds "supposes" his book has been in the making since the 1930s when he was a news correspondent in Berlin and became acquainted with Ernst Udet, the German ace who had shot down 62 British, French and American planes.

Some of the pilots in Reynolds' story: Eddie Rickenbacker, Oswald Boelcke, Werner Voss, Albert Ball, Elliott Springs, Britain's Mick Mannock, France's Rene Dorme and Germany's Baron Manfred von Richtofen. The aircraft they flew were primitive, but they blazed the trail for much of what we know today.—B.B.

Glass Reinforced Plastics. *Second Edition. Edited by Philip Morgan, Philosophical Library, New York. 276 pages. Price, $15.*

Text, of this edition has been thoroughly revised. Many of the chapters have been completely rewritten. In addition, there are completely new chapters on epoxide resins, the resin injection-molding process and chemical plant applications.

Included are facts on raw materials, fabrication techniques now in use and problems of specialized applications. There are 61 diagrams and 50 pages of photos.

Case Problems in Transportation Management. *By George P. Baker and Gayton E. Germane Harvard Business School Case Books. McGraw-Hill Book Co., New York. 523 pages. Price, $4.50.*

This is the only book of its type available in the field of transportation. It includes a number of hard-to-decide problems based on situations which confronted air, highway, ocean and railroad carriers. Among the air carriers mentioned are United Air Lines, American Airlines, Capital Airlines, World Wide Airways, Chicago and Southern Air Lines.

Case studies include problems concerning purchase of jet equipment, selection of a maintenance base location, fixing seat surcharge and berth fare on new airplanes, determining seating and cargo arrangements for DC-7 fleet, DC-4 coach seating, advertising airline safety, control of aircraft fuel and assigning stewardesses for Hawaiian flight.

Basic Mathematics for Radio and Electronics. *By F. M. Colebrook and J. W. Head. Third Edition. Philosophical Library, New York. 359 pages. Price, $6.*

A complete course in basic mathematics, primarily for radio or electronic engineers. Starting with algebra, the book covers indices, logarithims, series, limits, geometry, trigonometry, vectors and differential and integral calculus. The British authors have done a fine job of making interesting the mathematics necessary to electronics by using a step-by-step approach, coupled with entertaining and even amusing examples of such application.—H.P.S.

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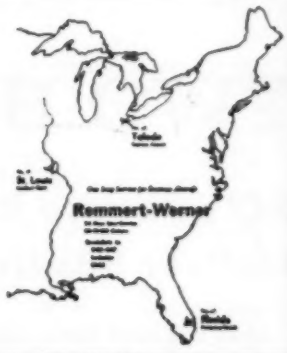

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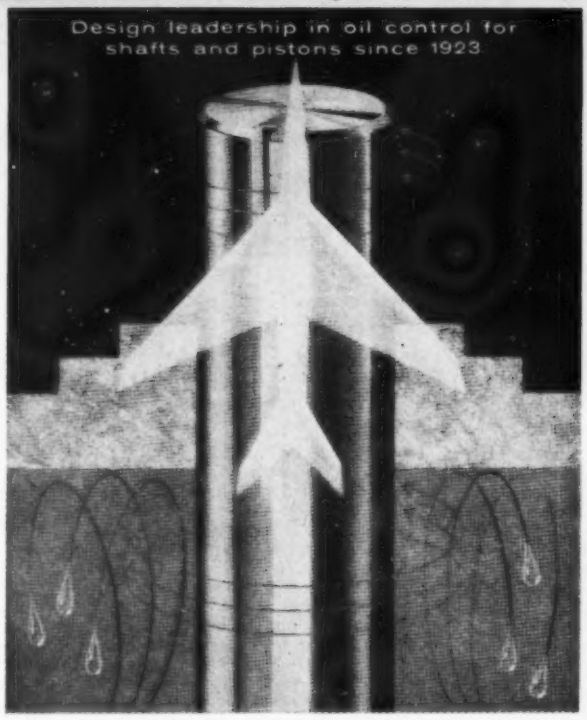

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EN ROUTE

by Wayne W. Parrish

Never saw much of Sydney, but who cares?

WELL THERE I WAS sleeping not too badly, curled up in a DC-4 seat as we landed, when I was awakened by the usual noises of unloading and loading and refueling. You know how it is on an all-night airplane ride: you're just half awake and not sure where you are.

Bless my soul, it was Mount Isa up in the bush country of Australia and I was on a 2,000-mile hop on Trans-Australia Airlines from Darwin to Sydney with half a day yet to go. It was just barely getting daylight but I had had a good snooze so I got fully awake to find the plane being loaded with women and kids. I was up front and was glad when nobody took the seat next to me as I might want to stretch out again.

I resumed reading my novel and we took off and shortly thereafter the stewardess came by and asked if I would like Worcestershire or tomato sauce with my sausage. Honestly at that time of morning such a question is enough to frighten the dead. My stomach must have given one gigantic rumble and I must have said "tomato sauce" because I don't even use Worcestershire in the middle of the day, let alone for breakfast.

So up came the breakfast, I mean the stewardess brought it to me on a tray, consisting of half a canned pear, one slice of bread, a tiny pot of marmalade, a big ol' fat sausage with major-league skin, some bacon fat, and a half stewed tomato, plus some sauce yet. I was given the choice of tea or coffee, black or white, and I chose coffee white, but I'm afraid it was neither black nor white and pretty under par in taste.

Aussie sausages are different

Now please get me right. I'm not saying this was a bad breakfast, per se; I guess a lot of folks like that mixture. All I'm trying to say is that in *my own way* of thinking this sausage and bacon fat breakfast just wouldn't quite make the "ten best breakfasts" competition around the world. But I found out that the Australians really go for those sausages at breakfast and I don't mean those nice fried country patties or tasty links we're used to. Them there Aussie sausages are fat, tough, mean and greasy old things that were wonderful in World War II when meat was short and even a little sawdust filling wasn't noticed. I think England must have dumped its surplus on Australia and they haven't used 'em all up yet.

The sun came up and the landscape seemed a lot like our barren or near-barren west and we plodded on hour after hour and I wondered if we ever would get to Sydney and I just about finished my book by the time we reached the big sprawling city with its red tile rooftops and famous big bridge and harbor and came in for a landing. I hadn't been there since the fall of 1944 so it was practically brand new as far as I was concerned.

The TAA terminal (each airline has its own in Sydney) was bright and bustling and well-dressed people were either coming or going. It was noon. I wasn't paged and didn't spot anybody I knew, so I waited for my bag and decided to go to the hotel where I was supposed to have a room. Just about the time I was ready to hop on a bus (the Australians have the best coordinated airport coach system in the world) I heard a page for me and in a matter of seconds I was greeted by John Ulm, public relations, Qantas Empire Airways.

So off we went to town in his car and to the Qantas-owned-and-operated Wentworth Hotel and to a good room where I pleaded for a few minutes before lunch to take a shower and shave and change my shirt.

Then came a slight shocker when brother Ulm, who is the son of the famous Australian Pacific flyer, told me that he had altered my schedule a little bit and that I was booked out to New Guinea early that evening instead of next day, and did I mind. Well, of course not. Why should I? Nothing to it at all. Just get off one overnight 2,000-mile hop in a DC-4 and get on another overnight 2,000-mile DC-4 hop back up to the tropics. I've been a shuttlecock before. Anyway I like to fly, don't I, nothing so completely restful as two successive nights on a good old DC-4 Vibration Special.

So my first day in Sydney consisted of a shower, shave, fast lunch and a haircut, the latter at a big department store where they had the biggest mass-production system I've ever seen anywhere. Seemed like a sea of chairs and barbers. Luckily I got a first-class tonsorial artist and managed to sneak in a nap at the hotel before heading out to the airport again for the long trek to Brisbane, Port Moresby, and Lae 'way up yonder in the tropics of New Guinea. Sydney was nice, wasn't it? Good old Sydney, wonder what it's like?

I began feeling like John Foster Dulles with perhaps one major exception. Whether or not I was sure of it, at least I *thought* I knew where I was going.

Out at the airport at the Qantas terminal I discovered that although New Guinea is under Australian administration, they treat it like a foreign country and I had to have a visa and a document and baggage inspection. I could scarcely contain myself with gay abandon when I discovered the majority of my fellow passengers were young cadets off to New Guinea for 21 months' military service and I could imagine getting a fine sleep with that load of Injuns aboard.

After we were loaded and taxied out, with the youngsters celebrating something like the end of the earth, we went back to the terminal with a mechanical. Quite late, and me dead tired, we finally took off and I was getting pretty hungry for dinner.

Ah, those amenities!

A good dinner it was, too, served by two stewards and a stewardess. The latter, it turned out, was on her first solo trip and every time she made an announcement the cadets gave rousing cheers. Early in the flight she came to my seat and wanted to know if I understood all the amenities. When I got back to the U.S. I discovered she was speaking about the location of lights, ash trays, how to recline the seat, call button, and the like.

Her name was Robin Kelso and she had been a nurse and she was blonde and she had delightfully bright eyes and in my fatigued condition, she could have explained all about those amenities for hour after hour in that nice soft accent and soothing, anxious-to-please voice and as the plane droned on in the night I was sure that Robin was most certainly the most wonderful stewardess in the whole wide world even if we both were only in a DC-4 en route to the hot, humid, sultry jungles of New Guinea.

Please, Robin, explain those amenities to me again, I'm so stupid about those things, and tell me again where you got such a nice name and such beautiful eyes and why didn't we meet so many years ago. There's really nothing like those amenities, Robin, when you explain them.

Came the dawn

When morning came I roused myself from a restless sleep. We were over the Coral Sea plodding along toward New Guinea. After a light breakfast Capt. P. H. Mathieson asked if I'd like to come up front to see the approach to the mountainous green with its cloud-shrouded mountains. It was a beautiful tropical sight.

Nearing Port Moresby, which many readers will remember from World War I days, I spotted a shipwreck near the harbor and nearer the shore, a twin-engined bomber under the water. We swung over some low-lying hills and came in on a steel mat runway, initially laid during the war and not yet replaced. The singing of tires on the matting brought back memories of many such landings during the war. There aren't many left in actual use. Plans are under way now to build a new runway for DC-6Bs at Port Moresby.

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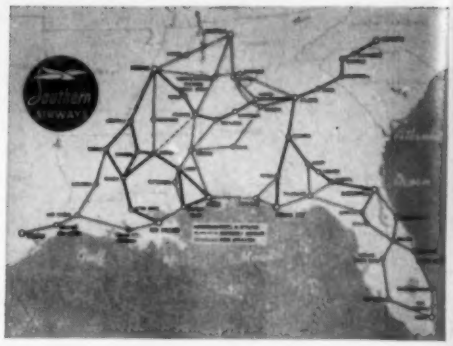

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